

# PATENT ABSTRACTS OF JAPAN

(11)Publication **11-341443**

n number :

(43)Date of **10.12.1999**

publication of  
application :

(51)Int.Cl.

**H04N 5/93**

**H04N 5/92**

(21)Applicati **10-190557**  
on number :

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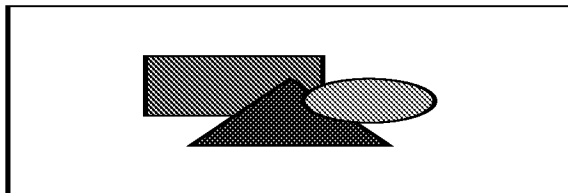
(22)Date of **06.07.1998**  
filing :

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(30)Priority

Priority number : **09181406** Priority date : **07.07.1997** Priority country : **JP**  
**10 75694** **24.03.1998** **JP**

(54) **MULTI-SCREEN DISPLAY SYSTEM**



user to easily recognize which kind of angle video  
angle reproduction is available and to select  
images.

angles or scenes that are reproducible for a same time

band are in existence, the reproduced image is divided automatically into a plurality of images,  
part or all of angles or scenes that are reproducible are simultaneously displayed (digest-  
displayed) on the divided screens. Or display contents of angles or scenes are automatically  
revised.



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## **CLAIMS**

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[Claim(s)]

[Claim 1] In what chooses predetermined two or more images from a multi-image which comprised two or more selectively renewable picture image data, and is reproduced, A method characterized by a thing of two or more display area which prepared two or more display area of said two or more images, and of which; preparation was done for which said refreshable two or more images are individually developed to each in part at least at each time.

[Claim 2] Based on the number of two or more images which detected the number of refreshable two or more images, and carried out the; aforementioned detection at said each time, determine a position and display size of display area to each two or more images, and; determination to a position carried out and each two or more display area of size. A method of developing refreshable two or more images individually at said each time according to claim 1.

[Claim 3] A viewing area is quadrisected if the number of two or more images which detected the number of refreshable two or more images, and carried out the; aforementioned detection at said each time is four or less [ 2 or more ]. If the number of two or more images which divided a viewing area into nine, prepared nine display area, and carried out the; aforementioned detection if the number of two or more images which prepared four display area and carried out the; aforementioned detection was nine or less [ 5 or more ] is four or less [ 2 or more ], to said four display area. A method according to claim 1 that the number of said detected two or more images is characterized by or more 5 thing for which information on refreshable two or more images is individually written in said nine display area at said each time if it is nine or less.

[Claim 4] A method of constituting size of said whole display area so that it may reduce at a predetermined rate when the number of said detected two or more images is nine or less [ 2 or more ] according to claim 3.

[Claim 5] A method of providing processing which specifies selectively what can be developed to said two or more display area among two or more picture image data which constitutes said multi-image according to any one of claims 1 to 4.

[Claim 6] A method of providing processing which changes picture image data developed by said two or more display area to reproduction orders according to any one of claims 1 to 5.

[Claim 7] A method of providing processing to which picture image data developed by said two or more display area is changed at random according to any one of claims 1 to 5.

[Claim 8] A method of providing processing to which the display period is changed according to the contents of picture image data, when picture image data developed by said two or more display area is displayed according to any one of claims 1 to 5.

[Claim 9] Said multi-image includes two or more multi-angle images selectively renewable in the

same time zone, A specific angle number which shows self is given to each multi-angle image, A method of providing processing which displays individually refreshable two or more multi-angle image with an own angle number at each time in said each of two or more display area according to any one of claims 1 to 8.

[Claim 10]A method of providing processing which will change said angle number corresponding to it if an image angle displayed on said two or more display area changes according to claim 9.

[Claim 11]It is what reproduces record data from a medium by which two or more angles which comprised two or more picture image data reproduced selectively were recorded on the same time zone, A predetermined angle is chosen out of said two or more angles. A means to reproduce; It is applied to playback equipment provided with an animation display area switching control means to control a change of area by which moving image reproduction is carried out in a picture of two or more angles by which a simultaneous display is carried out to two or more angle displaying means on which two or more of said two or more angles are displayed simultaneously on; screen, A remote controller which had a key which can order it a simultaneous display of said two or more angles in said playback equipment by predetermined operation.

[Claim 12]In what chooses one of the multi-angle of this, and is reproduced from a recording medium with which it comprised two or more picture image data selectively renewable in the same time zone, and \*\*\*\*\* multi-angle with a number was recorded in order of record, A multi-angle automatic change regeneration method possessing an automatic change process of choosing one angle automatically from said multi-angle, and changing a reproduction angle.

[Claim 13]A random number generation process at which said automatic change process generates a random number; the multi-angle automatic change regeneration method according to claim 12 including an angle number decision process which determines an angle number which should be chosen by a generated random number value.

[Claim 14]Said automatic change process, an angle number -- increment or a count process which carries out a decrement, and; -- the multi-angle automatic change regeneration method according to claim 12 including an angle number decision process which determines an angle number which should be chosen with counted value acquired at this angle number count process.

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[Translation done.]

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#### **DETAILED DESCRIPTION**

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to an information recording medium renewable with the reproducing system which reproduces the information in which a multi picture display is possible from a mass information recording medium, and this reproducing system.

[0002] It is related with the reproducing system which can perform digest reproduction of refreshable two or more scene (two or more angles) image at each time from the optical disc in which two or more selectively renewable multi scene images (multi-angle image) were especially recorded on the same time zone.

[0003] It is related with the reproducing system which can play various angle images with a change automatically from the optical disc in which the multi-angle image was recorded.

[0004]

[Description of the Prior Art] In recent years, with progress of improvement using laser with short wavelength in optical pickup art, high density recording technology, and data compression technology, large scale-ization of recording media, such as an optical disc, progressed and the amount of information recordable on a recording medium increased by leaps and bounds.

[0005] As opposed to the storage capacity of CD (compact disk) whose reading laser wavelength is 780 nm being about 650 MB, if an example is given, In DVD (a digital videodisc or a digital versatile disc) with a reading laser wavelength of 650 nm, the Information Storage Division layer can record the amount of digital information up to about 4.7 GB by the disk of a monolayer. Although DVD is an optical disc with a same diameter [ as CD ] of 120 mm, even if it is DVD of a monolayer disk, the storage capacity reaches by about 7 times the CD. In DVD, it is possible to provide the two-layer -4 layer Information Storage Division layer, and if a recording layer is multilayered, the storage capacity will become still larger.

[0006] Since huge information is recordable in DVD, the function which was not realized can be realized in CD or LD (laser disc which carried out analog recording of the video signal).

[0007] For example, the case where a certain music artist's live concert video is manufactured is assumed. In this case, photography inclusion of the scene with various patterns of a concert is carried out with two or more cameras (for example, only the "whole" band, a "vocalist", a "guitarist", a "bassist", and a "drummer" are photoed with five cameras, respectively). In this way, the scene image of five kinds of recorded camera angle will be edited by the time the last video work is completed. An editor (maker) determines in which portion of a video work the picture photoed with which camera is used, and makes it complete as one concert video in the edit process.

[0008]

[Problem(s) to be Solved by the Invention]In the conventional concert video work completed as mentioned above, a concert can be enjoyed only from the camera angle (most is usually a vocalist center) which the editor (maker) determined. In this case, if only a "guitarist" wants to always see in order that the televiewer (playback equipment user) of that video work may do the master of a guitarist's rendition, even if it will want, that televiewer's demand is not filled.

[0009]By the way, in the conventional above concert video since storage capacity became very large in DVD, It is possible to record individually all the images (only a guitarist's camera angle, only a bassist's camera angle, only a drummer's camera angle) of the same time zone recorded with five cameras. [ the camera angle of the whole band, ] [ only a vocalist's camera angle, ]A playback equipment user can choose freely by this the image (multi-angle image) photographed with each camera, and it can reproduce now. This is a multi-angle function of the first DVD to be introduced into the video media field, and DVD containing the video picture using this multi-angle function can be called multi-angle software.

[0010]However, when reproducing multi-angle software with an old DVD reproducer, he is able for a user to choose a desired camera angle image freely, and to reincarnate, but. change (or reset to the default of angle reproduction) of an angle selective state should do -- as long as there is nothing, only the once selected angle will always be reproduced after it. A demand of another user who would like to view and listen as usual concert video (original angle playback of the edited state which the video maker meant) is not filled with such a state.

[0011]Although what is necessary is just to choose it when the editor (maker) has recorded the conventional edited concert video as one angle, whenever it will view and listen to the image same in that case always and piles up the number of times of viewing and listening, it becomes less insipid, and freshness will be missing and a user will get bored.

[0012]When there are two or more angles which in the case of above-mentioned 1 angle inclusion will be wanted if a user wants to see, the demand of choosing only the angle to see arbitrarily and seeing it is unrealizable, the mask of the angle not to see is carried out and the demand of liking to choose and see other angles cannot be realized, either.

[0013]the case where there are two or more angles which will be wanted if a user wants to see -- the angle to see -- alternation -- or the demand of liking to choose automatically at random and to see being unrealizable, and the mask (skip) of the angle not to see being carried out, and, The demand of liking to choose other angles automatically and to see them is also unrealizable.

[0014]In a renewable scene, two or more angle (two or more scenes) image from the medium by which the multi-angle (multi scene) image was recorded a user, Unless it carries out angle (scene) change operation one by one and reproduces each angle (scene), it cannot know what kind of angle (scene) image will be renewable now.

[0015]By the way, the seamless angle change which the knot of an angle change is following in the flow of regeneration time, and the non seamless angle change with a knot of an angle change discontinuous in the flow of regeneration time are one of the angle changes of multi-angle software. for distinguishing automatically this seamless angle change and a non seamless angle change by the reproducing system side and performing an angle change -- a thing with a seamless angle change -- non -- it is necessary to take out the information which identifies whether it is seamless from a recording medium

[0016]This invention was made in view of the above-mentioned situation, and that 1st purpose is to provide the reproducing system (a device or a method is included) with which a user can recognize easily what kind of angle (scene) image is refreshable in the scene in which multi-

angle (multi scene) reproduction is possible.

[0017]The 2nd purpose of this invention is enabling it to perform the angle change of a multi-angle image automatically, It is providing the multi-angle automatic change reproducing system (a device or a method is included) which can realize the angle change function with little weariness which was varied to a user (multi-angle soft televiewer).

[0018]The 3rd purpose of this invention is to provide an information recording medium with the information for notifying a user of what kind of angle (scene) image is recorded in the scene in which multi-angle (multi scene) reproduction is possible.

[0019]In order that a reproducing system can detect automatically that for which a multi-angle image uses a seamless angle change, or the thing using a non seamless angle change, the 4th purpose of this invention, It is providing an information recording medium with the identification information of a seamless angle change and a non seamless angle change.

[0020]a computer with the multi-angle processing program with which the 5th purpose of this invention enables it to perform automatically the angle change (or simultaneous display of two or more multi-angle screens) of a multi-angle image -- it is providing a readable program holding medium.

[0021]

[Means for Solving the Problem]In order to attain the 1st purpose of the above, a reproducing system concerning this invention, When the same time zone has two or more refreshable angles or scenes, it is constituted so that two or more reproduction screens may be divided and the simultaneous display (digest display) of a part or all of refreshable two or more angles or two or more scenes can be carried out to each divided screen.

[0022]In order to attain the 2nd purpose of the above, a reproducing system concerning this invention, It comprises a recording medium with which a multi-angle image which comprised two or more selectively renewable picture image data was recorded on the same time zone so that one angle in said multi-angle may be chosen automatically and may be made as for reproduction and a display (auto angle display).

[0023]In order to attain the 3rd purpose of the above, to an information recording medium concerning this invention. In a scene (angle iron) which has two or more images of a refreshable angle or a scene in the same time zone, information (SML\_AGLI or NSML\_AGLI) relevant to the two or more angles or two or more scenes is recorded. By taking out information relevant to these two or more angles or two or more scenes from a medium, It comes to be able to carry out the simultaneous display of the image of refreshable two or more angles or two or more scenes in the same time zone on monitor display divided corresponding to the refreshable number of angles, or the number of scenes at the time of multi-angle or multi scene reproduction.

[0024]In order to attain the 4th purpose of the above, a video title set containing two or more cells which a video object unit which contains a video pack on which video information of a small unit (2kB) was recorded one or more comprises by gathering one or more is recorded on an information recording medium concerning this invention one or more. Here, It is what is constituted by the 1st angle cell (AGL\_C#1) which is constituted by said one or more cells and includes the 1st camera angle video information, and said one or more cells. Angle iron containing the 2nd angle cell (AGL\_C#i) which exists and includes the 2nd camera angle video information is recorded on said video title set. When reproducing this angle iron, An angle change flag (b24 of drawing 27) which shows whether a reproduction angle change which can be performed between said 1st angle cell (AGL\_C#1) and said 2nd angle cell (AGL\_C#i) is a non seamless angle change, and whether it is a seamless angle change, It is recorded on said video

title set. the contents of this angle change flag -- said reproduction angle change -- non -- it can be used for distinguishing automatically whether it is performed seamlessly whether it is carried out seamlessly.

[0025]a computer applied to this invention in order to attain the 5th purpose of the above -- to a readable program holding medium. A procedure (ST40-ST60) of comprising two or more picture image data selectively renewable in the same time zone, choosing a desired angle as the order of record automatically out of \*\*\*\*\* multi-angle with a number, and changing a reproduction angle is described.

[0026]or a computer concerning this invention -- to a readable program holding medium. Comprise two or more picture image data selectively renewable in the same time zone, and two or more angles are chosen as the order of record out of \*\*\*\*\* multi-angle with a number, A procedure (ST43) of determining a display position and display size of each angle on a reproduction screen according to the selected number of angles is described.

[0027]

[Embodiment of the Invention]Hereafter, with reference to Drawings, the physical and logical composition of the information recording medium used by the multi picture display system concerning the 1 embodiment of this invention, the multi-angle automatic switch system, and this system is explained. In order to avoid duplication explanation, the common reference mark is used for the portion which is common on a function over two or more Drawings.

[0028]Drawing 1 is a figure explaining the physical structure of the optical disc (DVD video disk only for playback) which can be used by this invention.

[0029]As shown in drawing 1, this optical disc 10 comprises the composite disk layer (a monolayer or two-layer) 18 of a couple, and the glue line [ being ultra-thin (for example, ultraviolet curing nature resin of 40 micrometer thickness) ] 20 inserted between this composite disk layer 18. Each composite disk layer 18 comprises the transparent substrate (for example, polycarbonate of 0.6-mm thickness) 14, and the recording layer 16 (embossing Information Storage Division layer 17 which vapor-deposited or carried out sputtering and formed aluminum, an aluminum alloy, or gold), i.e., a light reflection layer. On the field of the glue line 20, as the light reflection layer 16 (embossing Information Storage Division layer 17) contacts, it is stuck, and the disk layer 18 of these couples serves as a high recording density optical disc of 1.2-mm thickness.

[0030]The feed hole 22 is established in the optical disc 10, and the clamping area 24 for pressing down this optical disc 10 at the time of that rotation is established in the circumference of the feed hole 22 of disk both sides. The spindle of the disk motor which is not illustrated when an optical disk unit is loaded with the disk 10 is inserted in the feed hole 22. And while a disk rotates, the optical disc 10 is clamped by the disk clamber (not shown) in the clamping area 24.

[0031]The optical disc 10 has the information area 25 which can record a video data, audio information, and other information on the circumference of the clamping area 24 of the both sides.

[0032]The read out area 26 is formed in the outer periphery area among the information area 25, and among those it touches the clamping area 24, the read in area 27 is formed in the circumferential field. And between the read out area 26 and the read in area 27 is appointed as the data recording area 28.

[0033]The recording track as the data recording area 28 follows spiral shape, and is formed in the recording layer (light reflection layer) 16 of the information area 25. The continuation track is divided into two or more physical sectors, and the sequence number is given to these sectors.

Various data is recorded on the optical disc 10 by making this sector into a record unit.

[0034]The data recording area 28 of the information area 25 is actual data recording regions, and a video data (main video image data), sub picture data, and audio information are recorded as reproduction information as same pit sequence, the physical shape, i.e., embossed geometry, which bring about an optical change of state.

[0035]In the read-only optical disc (DVD-ROM disk) 10. A reflecting layer will be formed in the field of the transparent substrate 14 in which the pit sequence was beforehand formed in the transparent substrate 14 by the stamper, and this pit sequence was formed of vacuum evaporation or sputtering, and that reflecting layer (embossing layer) will be used as the recording layer 16.

[0036]In the read-only optical disc 10, the groove in particular as a recording track is not provided, but the pit sequence formed in the field of the transparent substrate 14 usually functions as a track. (However, in the DVD-RAM disk in which record and playback, or reading and writing is possible.) The above-mentioned groove is provided. In the optical disk reproducing device (DVD player) mentioned later, When a user (televiwer) operates the key input section or remote controller formed in the front panel of the device main frame, the data recorded on the optical disc 10 is renewable. The reproduced record data (main video image data, sub picture data, and voice data) is changed into an audio (sound) signal and a video signal within playback equipment, is sent to an external monitor section and loudspeaker part, and is reproduced as a video picture and a sound.

[0037]Drawing 2 is a figure explaining the track/sector structure of the record section of the optical disc (DVD-ROM disk only for playback) of drawing 1.

[0038]This optical disc 10 is a double-sided lamination disk which has the amount of storage capacity of 4.7 G bytes of one side, for example, and many recording tracks are arranged in the data recording area 28 of a before [ from the read in area 27 by the side of disk inner circumference / the read out area 26 by the side of a disk periphery ]. Each track comprises many logical sectors and the variety of information (digital data compressed suitably) is stored in each sector.

[0039]The embossing Information Storage Division layer 17 of the information area 25 shown in drawing 1 is usually made into the field where data is recorded, and a track follows spiral shape and it is formed. As that continuous track is shown in drawing 2, it is divided into two or more logical sectors (the minimum record unit) of a fixed storage capacity, and data is recorded on the basis of this logical sector.

[0040]The storage capacity of this one logical sector is decided to be the same 2048 bytes (or 2 K bytes) as 1 packed-data length which mentions later. The data recording area 28 of the information area 25 is actual data recording regions, and management data, main video image data, sub picture data, and voice (audio) data are similarly recorded as physical condition change of a pit.

[0041]In the read-only super-high-density optical disc (DVD-ROM disk) 10, a reflecting layer is formed in the field of the transparent substrate 14 in which the pit sequence was beforehand formed in the transparent substrate 14 by the stamper, and this pit sequence was formed of vacuum evaporation or sputtering, and that reflecting layer is formed as the recording layer 14. Usually, in this read-only optical disc 10, the groove in particular as a track is not provided, but the pit sequence is defined as a track.

[0042]Drawing 3 is a figure explaining the physical structure of the optical discs (the object for playback, and the DVD disk for recording playback; DVD-RAM / DVD-RW disk) which can be used by this invention.

[0043]As shown in drawing 3, this optical disc 10 has the structure which pasted together the transparent substrate 14 of the couple in which the recording layer 17 was formed, respectively by the glue line 20. Each substrate 14 can be constituted from polycarbonate of 0.6-mm thickness, and can constitute the glue line 20 from ultraviolet curing nature resin [ being ultra-thin (for example, 40 micrometer thickness) ]. As the recording layer 17 contacts on the field of the glue line 20, when it sticks the 0.6-mm board 14 of these couples, the large volumetric DVD 10 of 1.2-mm thickness is obtained.

[0044]The recording layer 17 can have ROM/RAM two-layer structure. In that case, in view of the read-out side 19 side, a ROM layer / light reflection layer (embossing layer) 17A is formed in the nearer one, and a RAM layer / phase change recording layer 17B is formed in the distant one, in view of the read-out side 19 side.

[0045]A recording track follows spiral shape and is formed in the recording layer (light reflection layer) 17 of the information area 25. The continuation track is divided into two or more physical sectors, and the sequence number is given to these sectors. Various data is recorded on the optical disc 10 by making this sector into a record unit.

[0046]The data recording area 28 is actual data recording regions, and as record and reproduction information, Audio information, such as sub picture data, such as video datas (main video image data), such as a movie, a title, a menu, and words, a sound effect, is recorded as same pit sequence (the physical shape or the phase state which results in an optical change to a laser reflection).

[0047]As for the case of the RAM disk of double-sided recording, the optical disc 10 can constitute each recording layer 17 from one layer of one side by 3 layering which put the phase change recording material layer (for example, germanium<sub>2</sub>Sb<sub>2</sub>Te<sub>5</sub>) with two zinc sulfide and silicon oxide mixtures (ZnS-SiO<sub>2</sub>).

[0048]In the case of the RAM disk of one side record, the optical disc 10 can constitute the recording layer 17 by the side of the read-out side 19 from one layer of one side by 3 layering containing the above-mentioned phase change recording material layer. In this case, the layer 17 which sees from the read-out side 19 and is arranged in an opposite hand does not need to be the Information Storage Division layer, and a mere dummy layer may be sufficient as it.

[0049]When the optical discs 10 are one side reading type two-layer RAM / ROM disk, the two recording layers 17 can consist of one phase change recording layer (in view of the read-out side 19 back side; for reading and writing), and one translucent metallic reflective layer (in view of the read-out side 19 near-side; only for playback).

[0050]When the optical disc 10 is DVD-R of write once, polycarbonate can be used as a substrate, gold can be used as a reflection film which is not illustrated, and ultraviolet curing resin can be used as a protective film which is not illustrated. In this case, organic coloring matter is used for the recording layer 17. As this organic coloring matter, cyanine, squarylium, a crocodile nick, triphenyl menthonaphtene system coloring matter, a xanthene, quinone system coloring matter (naphthoquinone, anthraquinone, etc.), metal complex system coloring matter (phtalo cyanogen, Bolu Phi Lynne, a dithiol complex, etc.), and others are available.

[0051]Data writing to such a DVD-R disk can be performed, for example using a semiconductor laser with an output of about 6-12 mW on the wavelength of 650 nm.

[0052]When the optical disc 10 is an one side reading type two-layer ROM disk, the two recording layers 17 can consist of one metallic reflective layer (in view of the read-out side 19 the back side), and one translucent metallic reflective layer (in view of the read-out side 19 near side).

[0053]In the read-only DVD-ROM disk 10, reflecting layers, such as metal, will be formed in the field of the substrate 14 in which the pit sequence was beforehand formed in the substrate 14 by the stamper, and this pit sequence was formed, and this reflecting layer will be used as the recording layer 17. In such a DVD-ROM disk 10, the groove in particular as a recording track is not provided, but the pit sequence formed in the field of the substrate 14 usually functions as a track.

[0054]In various kinds of above-mentioned optical discs 10, the ROM information only for playback is recorded on the recording layer 17 as an embossing signal. On the other hand, such an embossing signal is not minced by the substrate 14 with the recording layer 17 for reading and writing (or for write once), instead the groove slot of continuation is minced. A phase change recording layer is provided in this groove slot. In the case of the DVD-RAM disk for reading and writing, the phase change recording layer of a land part is also further used for Information Storage Division besides a groove.

[0055]The substrate 14 on the back side does not need to have the transparent optical disc 10 to the laser for reading and writing, seeing from the read-out side 19 in an one side reading type (the recording layer also of one layer or two-layer is) case. In this case, label printing may be carried out all over back side board 14.

[0056]The DVD digital video recorder mentioned later can be constituted so that the repetitive recording and repeated regeneration (reading and writing) to a DVD-RAM disk (or DVD-RW disk), one the record and repeated regeneration to a DVD-R disk, and the repeated regeneration to a DVD-ROM disk may be possible.

[0057]Drawing 4 is a figure explaining the track/sector structure of the record section of the optical disc (the object for playback, and the DVD disk for recording playback) of drawing 3.

[0058]When the disk 10 is DVD-RAM (or DVD-RW), in order to protect a delicate disc face, the main part of the disk 10 is stored by the cartridge 11. If the DVD-RAM disk 10 is inserted in the disk drive of the DVD VCR mentioned later the whole cartridge 11, It is clamped by the turntable of the spindle motor which the disk 10 is pulled out and is not illustrated from the cartridge 11, and as the optical head which is not illustrated is faced, it rotates.

[0059]On the other hand, when the disk 10 is DVD-R or DVD-ROM, the main part of the disk 10 is not stored by the cartridge 11, but the directly set of the naked disk 10 comes to be carried out to the disk tray of a disk drive.

[0060]Data recording tracks follow spiral shape and are formed in the recording layer 17 of the information area 25 shown in drawing 3. That continuous track is divided into two or more logical sectors (the minimum record unit) of a fixed storage capacity as shown in drawing 4, and data is recorded on the basis of this logical sector. The storage capacity of one logical sector is decided to be the same 2048 bytes (or 2 K bytes) as 1 packed-data length.

[0061]It is actual data recording regions and management data, main video image (video) data, sub picture data, and voice (audio) data are similarly recorded on the data recording area 28.

[0062]The data recording area 28 of the disk 10 of drawing 3 can be divided into ring shape (the shape of annual rings) in two or more recording area (two or more recording zones). Although disk rotational speed differs for every recording zone, in each zone, linear velocity or angular velocity can be made regularity. In this case, it can provide for every zone, spare recording area (free space), i.e., spare area. The free space for every zone of this can be collected, and it can be considered as the reserve area of that disk 10.

[0063]Drawing 5 is a figure explaining the structure of the data recorded on the light reflection layer 16 of the optical disc of drawing 1, or ROM layer 17A of the optical disc of drawing 3.

[0064]The data recording area 28 formed in the optical disc 10 has volume and a file structure as shown in drawing 5. The logical format of this structure is defined based on ISO9660 and the universal disc format (UDF) bridge which are one of the standards, for example.

[0065]The data recording area 28 of a before [ from the read in area 27 / the read out area 26 ] is assigned as a volume space, This volume space can include the space for the application of a specific standard (standard of DVD), and the space of sakes other than the application of this specific standard.

[0066]The volume space of the data recording area 28 is physically divided into many sectors, and the sequence number is given to those physical sectors. The logical address of the data recorded on this volume space (data recording area 28) means the logical sector number (LSN) so that it may be set on ISO9660 and a UDF bridge. The logic sector size here has been 2048 bytes (or 2 K bytes) like the physical sector size. To the logical sector number (LSN), the sequence number is added corresponding to the ascending order of a physical sector number.

[0067]Unlike the logical sector, redundant information, including error correction information etc., is added to the physical sector. For this reason, if a physical sector size is said strictly, it is not in agreement with a logic sector size.

[0068]As shown in drawing 5, the volume space of the data recording area 28 has a layered structure, and includes the DVD video field 71 which consists of volume and 70 or 1 or more file structure fields video title set VTS72, and other record sections 73. These fields are classified on the boundary of a logical sector. Here, one logical sector is defined as 2048 bytes, and 1 logical block is also defined as 2048 bytes. Therefore, one logical sector is defined as 1 logical block, a pair, etc.

[0069]The file structure field 70 is equivalent to the management domain provided in ISO9660 and a UDF bridge. It is stored in the memory of the playback equipment (DVD player) which the video manager's VMG contents mention later based on description of this field 70.

[0070]The video manager VMG comprises two or more files 74A, and for these files. The information (video manager information VMGI75, video object set VMGM\_VOBS for video manager menus, video manager information backup file VMGI\_BUP) which manages the video title set (VTS#1-#n) 72 is described.

[0071]The video data compressed into each video title set VTS72 by predetermined standards, such as MPEG (video pack), It is compressed by the predetermined standard and with or incompressible audio information (audio pack) and the sub picture data (sub video image pack; 1 pixel contains the bit map data defined by two or more bits) by which run length compression was carried out. The information (navigation pack; reproduction control information / presentation control information PCI, and data search information DSI are included) for reproducing these data is stored.

[0072]This video title set (VTS) 72 as well as the video manager VMG comprises two or more files 74B. Each file 74B Video title set information (VTSI), the object set (VTSM\_VOBS) for video title set menus, The video object set for video title set titles (VTSTT\_VOBS; a maximum of 9 file) and backup (VTSI\_BUP) of video title set information are included.

[0073]Here, the number of the files 74B which the number of the video title sets (VTS#1-#n) 72 is restricted to a maximum of 99 pieces, and constitute each video title set (VTS) 72 assumes that it is provided in a maximum of 12 pieces. These files 74A and 74B are the boundaries of a logical sector, and are classified similarly.

[0074]Available information or other information which are not related to a video title set are recordable on other record sections 73 by the video title set (VTS) 72 mentioned above. The

other record sections 73 may be deleted, if it is not indispensable and is not used.

[0075]Each video title set (VTS) 72 of drawing 5 includes two or more video object sets (VTSTT\_VOBS). In the video object set (VOBS) in the video title set (VTS) 72. The video object set (VTSM\_VOBS) for video title set menus, And there is a video object set (VTSTT\_VOBS) for the title of one or more video title sets, and it has the structure where any video object set is the same only by the uses differing.

[0076]A video object set (VTSTT\_VOBS) comprises one or more video object units (VOBU), and each video object unit (VOBU) comprises one or more cells. And one or more program chains (PGC) are recorded by the video object set (VTSTT\_VOBS) which is the set which made the cell the unit. Each story which constitutes a multi-story can constitute this PGC in a unit.

[0077]If one PGC is compared to one drama, if two or more cells which constitute this PGC correspond to a scene various [ in a drama ], they can be interpreted. The contents (or contents of the cell) of this PGC are determined by the software provider who makes the contents recorded, for example on the disk 10.

[0078]Each angle which constitutes multi-angle comprises a cell unit.

[0079]Drawing 6 shows the layered structure of the information included in video object set VTSTT\_VOBS of drawing 5.

[0080]As shown in drawing 6, video object set VOBS82 is defined as one or more sets of video object VOB83. Video object VOB83 under video object set VOBS82 is used for the same use.

[0081]The video object set (VTSM\_VOBS) 82 for menus usually comprises the one video object 83, and two or more data for a menu screen display is stored there. On the other hand, the video object set (VTSTT\_VOBS) 82 for tight recettes usually comprises two or more video objects 83.

[0082]here, the video object 83 which constitutes the video object set (VTSTT\_VOBS) 82 for tight recettes is equivalent to the picture image data of a performance of the band, if the concert video of a certain lock bands is taken for an example -- then, it can think. In this case, the 3rd music of the concert program of that band is renewable by specifying the video object 83.

[0083]To the video object 83 which constitutes the video object set (VTSM\_VOBS) 82 for menus. The menu data of the concert program all songs of the band is stored, and specific music, for example, an encore program, can be reproduced according to the display of the menu.

[0084]The one video object 83 can constitute the one video object set 82 from the usual video program. In this case, one video stream will be completed by the one video object 83.

[0085]On the other hand, in the collection of animation of for example, two or more stories, or the movie of omnibus form, two or more video streams (two or more program chains) can be provided during 1 video-object set 82 corresponding to each story. In this case, it will be stored in the video object 83 to which each video stream corresponds. In that case, the audio stream and auxiliary video stream relevant to each video stream are also completed in each video object 83.

[0086]An identification number (IDN#i;i=0-i) is given to the video object (VOB) 83, and that video object 83 can be specified as it with this identification number. The video object 83 comprises 1 or two or more cells 84. Although the usual video stream comprises two or more cells, the video stream for menus may comprise the one cell 84.

[0087]Like the case of the video object (VOB) 83, an identification number (C\_IDN#j) is given to each cell, and this cell identification number (C\_IDN#j;j=0-j) can be specified as it. At the time of change of the angle explained later, an angle is changed by specifying these cell numbers.

[0088]Here, the above-mentioned angle change means changing the angle (camera angle) which usually looks at an object image. If it says in the example of lock concert video, in the playing

scene (the same event) of the same music, it means that the scene from various angles, such as a scene caught to the vocalist subject, a scene caught to the guitarist subject, and a scene caught to the drummer subject, can be seen.

[0089]In the case where angle selection can be performed as a case where angle change is made, according to a televiewer's liking, and the flow of a story, automatically, the same scene changes an angle and may be repeated (when a software maker / provider constitutes a story such).

[0090]As a case where an angle is selected, some are following. In namely, the case of the non seamless reproduction discontinuous in time which returns to the same scene beginning and changes an angle (for example, when the scene by which camera angle changes to another angle on the scene of the moment a boxer puts in a counterpunch, and a counter begins to be hammered out again is reproduced). In the case of the seamless reproduction which changes an angle on the scene following the scene and which continued in time (for example, the scene toward which the partner who camera angle changed to another angle the moment the boxer put in the counter and the punch entered, and received the counter is blown away continuously in time.) It may be reproduced.

[0091]As shown in drawing 6, each cell 84 is constituted by the one or more video object units (VOBU) 85. And each video object unit 85 is constituted as an aggregate (pack string) of the video pack 88, the sub video image pack 90, and the audio pack 91 which make the navigation pack 86 a head. That is, the video object unit 85 is defined as a meeting of all the packs recorded until just before the following navigation pack 86 from a certain navigation pack 86.

[0092]These packs serve as the minimum unit at the time of performing data transfer processing. The minimum unit which performs processing on logic is a cell unit, the processing on logic is this cell unit, and it is \*\*\*\*\*.

[0093]The above-mentioned navigation pack 86 is incorporated into the video object unit 85 so that any angle change (non seamless reproduction and seamless reproduction) can be realized.

[0094]The regeneration time of the above-mentioned video object unit 85 is equivalent to the regeneration time of the video data which comprises one or more image groups (omitting [ Glue PUOB picture; ] GOP) contained in the video object unit 85, and the regeneration time is defined within the limits of 0.4 second - 1.2 seconds. In an MPEG standard, 1GOP is usually about 0.5 second, and is the picture data compressed to reproduce the picture of about 15 sheets in the meantime.

[0095]When the video object unit 85 contains a video data, GOP (MPEG standard conformity) which comprises the video pack 88, the sub video image pack 90, and the audio pack 91 is arranged, and a video-data stream is constituted. However, regardless of the number of these GOP(s), the video object unit 85 is defined on the basis of the regeneration time of GOP, and in that head, as shown in drawing 6, the navigation pack 86 is arranged.

[0096]Even if it is in the regenerative data of only an audio and/or sub picture data, the video object unit 85 is made into one unit, and regenerative data is constituted. For example, when the video object unit 85 comprises only the audio pack 91 by making the navigation pack 86 into a head and it is, The audio pack 91 which should be reproduced like the case of the video object 83 of a video data in the regeneration time of the video object unit 85 to which the audio information belongs is stored in the video object unit 85.

[0097]By the way, in the DVD VCR which can record the video title set VTS including the video object set 82 of structure as shown in drawing 6 on the optical disc 10, the case where he would like to edit the contents of record after record of this VTS arises. Since it replies to this demand, the straw-man pack 89 can be suitably inserted into each video object unit (VOBU) 85.

This straw-man pack 89 can be used when recording the data for edit later.

[0098]There are some which constitute each VOB<sub>U85</sub> without the navigation pack of drawing 6 as a recording format of a DVD VCR.

[0099]Drawing 7 is a figure explaining the contents of each pack (data read from a disk) included in the video object unit of drawing 6.

[0100]Drawing 7 reads the record data currently recorded on the optical disc 10, and shows the data row (pack string) of the pack style outputted in a disk drive part a signal recovery and after carrying out an error correction.

[0101]this pack string -- a head -- the navigation pack (control pack) 86 -- after that, it is in random order and a video pack, a straw-man pack, a sub video image pack, an audio pack, etc. are contained. All of these packs comprise data of a 2048-byte unit like the logical sector of drawing 2.

[0102]The navigation pack 86, The pack header 110, Reproduction control information / presentation control information (Presentation Control Information=PCI) packet 116, and the data retrieval information (Data Search Information=DSI) packet 117 are included. The PCI packet 116 comprises the packet header 112 and the PCI data 113, and DSI packet 117 comprises the packet header 114 and the DSI data 115. The PCI packet 116 contains the control data which uses DSI packet 117 at the time of a seamless angle change including the control data used at the time of a non seamless angle change.

[0103]Here, the above-mentioned angle change means usually changing the angle (camera angle) which looks at an object image. If it says in the example of lock concert video, in the playing scene (the same event) of the same music, it means that the scene from various angles, such as a scene caught to the vocalist subject, a scene caught to the guitarist subject, and a scene caught to the drummer subject, can be seen.

[0104]As a case where an angle change (or angle change) is made, When angle selection can be performed according to a televiewer's liking, In the flow of a story, automatically, the same scene changes an angle and may be repeated (when a software maker / provider constitutes a story such and the user of; or the DVD VCR mentioned later performs such edit).

[0105]As a case where an angle is selected, some are following. In namely, the case of the non seamless reproduction discontinuous in time which returns to the same scene beginning and changes an angle (for example, when the scene by which camera angle changes to another angle on the scene of the moment a boxer puts in a counterpunch, and a counter begins to be hammered out again is reproduced). In the case of the seamless reproduction which changes an angle on the scene following the scene and which continued in time (for example, the scene toward which the partner who camera angle changed to another angle the moment the boxer put in the counter and the punch entered, and received the counter is blown away continuously in time.) It may be reproduced.

[0106]The video pack 88 comprises the pack header 881 and the video packet 882. The straw-man pack 89 comprises the pack header 891 and the PATINGU packet 890, and the PATINGU packet 890 comprises the packet header 892 and the padding data 893. However, it is put into invalid data by the padding data 893.

[0107]The sub video image pack 90 comprises the pack header 901 and the sub video image packet 902. The audio pack 91 comprises the pack header 911 and the audio packet 912.

[0108]The decoding time stamp (DST) and the presentation time stamp (PTS) are recorded on this packet header including the packet header which the video packet 882 of drawing 7 does not illustrate. The presentation time stamp (PTS) is recorded on those packet headers including the

packet header which does not illustrate the sub video image packet 902 and the audio packet 912, respectively.

[0109]Drawing 8 shows the data structure for navigation pack 1 pack of drawing 7.

[0110]That is, the navigation pack 86 of one pack comprises 2010 bytes of navigation data containing the system header 111 of 110 or 24 bytes of pack header [ 14 bytes of ], and two packets (116, 117). Two packets which constitute this navigation data are the reproduction-control-information (PCI) packets 116 and the data search information (DSI) packets 117 which were mentioned above.

[0111]The PCI packet 116 comprises 6 bytes of the packet header 112A, 1 byte of the substream identifier (substream ID) 112B, and 979 bytes of the PCI data 113. The data stream of the PCI data 113 is specified by eight bit codes "00000000" of substream ID112B.

[0112]DSI packet 117 comprises 6 bytes of the packet header 114A, 1 byte of the substream identifier (substream ID) 114B, and 1017 bytes of the DSI data 115. The data stream of the DSI data 115 is specified by eight bit codes "00000001" of substream ID114B.

[0113]The data length for one pack of the navigation pack 86 constituted in this way will be 2048 bytes (2 K bytes) equivalent to one logical sector of drawing 2.

[0114]The pack header 110 and the system header 111 of drawing 8 are defined by the system layer of MPEG 2. That is, the information on a pack start code, a system clock reference (SCR), and a multiplexing rate is stored in the pack header 110, and the bit rate and stream ID are indicated to the system header 111. Similarly, a packet start code, packet length, and stream ID are stored in the packet header 112A of the PCI packet 116, and the packet header 114A of DSI packet 117 as provided in the system layer of MPEG 2.

[0115]It is as follows when the layered structure of the PCI packet 116 stored in the navigation pack 86 of drawing 8 and DSI packet 117 is applied to drawing 6 (the layer level is divided by the slash).

[0116]The angle information (NSML\_AGLI of drawing 13) for the non seamless reproduction later mentioned to the PCI packet 116 in the bottom of the heap of the

VOBS/VOB/CELL/VOBU/NV-PACK/PCI&DSI above-mentioned layered structure is stored,

The angle information (SML\_AGLI of drawing 19) for the seamless reproduction later mentioned to DSI packet 117 which is similarly in the bottom of the heap is stored. When performing multiangle reproduction in this embodiment, required angle information will be taken out from the PCI packet 116 or DSI packet 117 in the above-mentioned layered structure.

[0117]The straw-man pack 89 of drawing 7 has the following structures. That is, the straw-man pack 89 of one pack is with the pack header 891, the packet header 892 with predetermined stream ID, and the padding data 893 filled up with the predetermined code, and is constituted. (The packet header 892 and patin GUDETA 893 constitute the PATINGU packet.) The contents in particular of the padding data 893 of an intact straw-man pack do not have a meaning. This straw-man pack 89 can be suitably used, when editing these contents of recording after predetermined recording is made by the disk 10 of drawing 4.

[0118]For example, the case where record the videotape which recorded the family travel on the DVD-RAM (or DVD-RW) disk 10, and it is edited with a portable video camera is considered.

[0119]In this case, only a video scene to summarize on the disk of one sheet first is selectively recorded on the disk 10. This video scene is recorded on the video pack 88. The sound simultaneously recorded with the video camera is recorded on the audio pack 91.

[0120]VOBU85 containing this video pack 88 grade has the navigation pack 86 in that head. As shown in drawing 7, this navigation pack 86 contains reproduction-control-information PCI and

data retrieval information DSI. The reproduction procedure of each VOB is controllable using this PCI or DSI (for example, a discontinuous scene can be connected automatically or a multi-angle scene can be recorded).

[0121]After carrying out edit recording from videotape at the disk 10, when postrecording a sound, a sound effect, etc. per VOB on each scene, or when adding background music BGM, a postrecording sound or BGM can be recorded straw-man pack 89. When adding description of the contents of recording, the sub video image of an additional character, a figure, etc. can be recorded on the straw-man pack 89. The insertion video can also be recorded straw-man pack 89 to insert an additional video picture furthermore.

[0122]The postrecording sound mentioned above is written in the padding data 893 of the straw-man pack 89 used as an audio pack. Description of the above-mentioned addition is written in the padding data 893 of the straw-man pack 89 used as a sub video image pack. Similarly, the above-mentioned insertion video is written in the padding data 893 of the straw-man pack 89 used as a video pack.

[0123]That is, the straw-man pack 89 is a pack like a wild card which can also turn into a video pack in an audio pack and a sub video image pack by the purpose of use.

[0124]Drawing 9 shows the PCI packet 116 contained in the navigation pack 86 arranged at the head of each VOB85. The PCI packet 116 so that it may illustrate, Reproduction-control-information PCI(PCI data) 113 which is navigation data for changing display information or the contents of reproduction (the contents of a presentation) synchronizing with the reproduction state of the video data in the video object unit (VOB) 85 is included.

[0125]The navigation pack (NV\_PCK) 86, It can arrange just before the video pack (if it says by drawing 6, it will be the 2nd video pack 88 from the lower-berth left) in which the data of the beginning in the video object unit (VOB#n) 85 shown in drawing 9 or a corresponding glue PUOB picture (GOP) is contained. When the video object unit 85 does not contain a video pack, the navigation pack 86 is arranged at the head of an object unit including the first audio pack or sub video image pack of the correspondence GOP. A required thing is only that the navigation pack 86 is arranged at the head of the video object unit 85 here.

[0126]Thus, the regeneration time of a video object unit is defined on the basis of the unit by which video is played like [ even if it is a case where the video object unit 85 does not contain a video pack ] the case where the video object unit contains the video pack.

[0127]Here, a glue PUOB picture (GOP) is a data row of continuous two or more screens compressed according to the standard of MPEG. The image data of the multiple frame which continued when this compressed data was elongated is obtained, and an animation can be reproduced by this image data.

[0128]Drawing 10 shows the contents of the reproduction control information (PCI data) 113 of drawing 9. The PCI data 113 includes 60 bytes of PCI general information (PCI\_GI), 36 bytes of angle information (NSML\_AGLI) for non seamless reproduction, 694 bytes of highlight information (HLI), and 189 bytes of recorded information (RECI). This recorded information (RECI) can contain the copyright management code (ISRC) of international standards.

[0129]The above-mentioned highlight information HLI can be used when performing the following highlight processings. That is, MPU (or CPU) of the playback equipment (DVD video player) mentioned later reads the highlight information HLI, and detects the X/Y coordinate value of the rectangular area (highlight button) displayed with a sub video image, a color, a contrast value, etc. According to these detection information, MPU of a DVD video player performs highlight processing, for example to the display of a menu selection etc. This highlight

processing is used in the user interface on vision as a means which enables it to recognize easily the specific item as which the user was displayed. When the DVD video title recorded on the optical disc 10 is specifically a program of multilingual correspondence, A specific spoken language (for example, English) and title language (for example, Japanese) of specific language are chosen with the highlight button displayed so that it might be conspicuous on vision by highlight processing.

[0130]Drawing 11 shows the contents of reproduction-control-information general information PCI\_GI of drawing 10.

[0131]In this reproduction-control-information general information PCI\_GI. The logical block number (NV\_PCK\_LBN) of a navigation pack, The category (VOBU\_CAT) of a video object unit (VOBU), User's operation control (VOBU\_UOP\_CTL) of a video object unit (VOBU), The display start time (VOBU\_S\_PTM) of a video object unit (VOBU), The display end time (VOBU\_E\_PTM) of a video object unit (VOBU), the display end time (VOBU\_SE\_PTM) of the sequence end in a video object unit (VOBU), and cell lapsed time (C\_ELTM) are indicated.

[0132]Here the above-mentioned logical block number (NV\_PCK\_LBN), The relative block count from the logical block of the beginning of the video object set (VOBS) with which the PCI was contained shows the address (recording position) of a navigation pack with which reproduction control information (PCI) is included.

[0133]The above-mentioned category (VOBU\_CAT) indicates the contents of the copy protection of the analog signal corresponding to the video and the sub video image in the video object unit (VOBU) in which reproduction control information (PCI) is included.

[0134]The above-mentioned user's operation control (VOBU\_UOP\_CTL) indicates the user's operation forbidden during the display (presentation) of the video object unit (VOBU) in which reproduction control information (PCI) is included.

[0135]The above-mentioned display start time (VOBU\_S\_PTM) indicates the display (presentation) time of onset of a video object unit (VOBU) when reproduction control information (PCI) is included. Speaking more concretely, this VOBUS\_PTM's pointing out the display start time of the first image (the first picture) in the display order of GOP of the beginning in a video object unit (VOBU).

[0136]The above-mentioned display end time (VOBU\_E\_PTM) indicates the display (presentation) end time of the video object unit (VOBU) in which reproduction control information (PCI) is included. While the video data in a video object unit (VOBU) continuing speaking more concretely, this VOBUE\_PTM points out the display end time of the image (the last picture) of the last in the display order of GOP of the last in a video object unit (VOBU).

[0137]On the other hand, when a video data does not exist in a video object unit (VOBU), or when reproduction of the video object unit (VOBU) is suspended, This VOBUE\_PTM comes to point out the end time of the virtual video data by which the arylene was carried out to the time grid of the field interval (NTSC video 1 / 60 seconds).

[0138]The above-mentioned display end time (VOBU\_SE\_PTM) indicates the display (presentation) end time by the sequence end code of the video data in the video object unit (VOBU) in which reproduction control information (PCI) is included. Speaking more concretely, pointing out the display end time of the image (the last picture) of the last of the display order in which the sequence end code in a video object unit (VOBU) is contained. When an image with a sequence end code (picture) does not exist in a video object unit (VOBU), 00000000 h (h is hexadecimal mind) enters VOBUSE\_PTM.

[0139]The above-mentioned cell lapsed time (C\_ELTM) from the first video frame in the display

order of the cell in which reproduction control information (PCI) is included. The time, the part, second, and frame of BCD form describe the relative display (presentation) time to the first video frame in the display order of the video object unit (VOBU) in which this PCI is contained. When there is no video data into a video object unit (VOBU), said virtual video frame of the beginning of a video data is used as the above-mentioned video frame.

[0140]Drawing 12 is a figure explaining the contents of VOB user's operation control VOB\_UOP\_CTL of drawing 11.

[0141]This user's operation control VOB\_UOP\_CTL comprised 4 bytes (32 bits), and has determined the propriety of the specific operation in VOB under reproduction by the user's operation inhibit flags UOP3-UOP16 contained in it, and UOP18-UOP24. By namely, each user's operation prohibition flag bit (UOP3-UOP16;UOP18-UOP24). When the contents of a bit are 0b, it is shown that corresponding user's operation is permitted, and when the contents of a bit are 1b, it is shown that corresponding user's operation is forbidden.

[0142]User's operation control VOB\_UOP\_CTL the user's operation prohibition flag bit (UOP3-UOP16;UOP18-UOP24) in the video object unit VOB was described to be is embedded at the low order hierarchy of the video title set VTS of drawing 5.

[0143]Namely, video object set VOBS82 contained in the video title set VTS as shown in drawing 6 contains the navigation pack 86 (drawing 8), This navigation pack 86 contains reproduction-control-information PCI (drawing 9), this reproduction-control-information PCI contains PCI general information PCI\_GI (drawing 10), and this PCI general information PCI\_GI contains user's operation control VOB\_UOP\_CTL (drawing 11). Thus, by following a hierarchy path called VTS/VOBS/NV\_PCK/PCI/PCI\_GI/VOB\_UOP\_CTL, the above-mentioned user's operation prohibition flag bit (UOP3-UOP16;UOP18-UOP24) can be gained.

[0144]Drawing 13 shows the contents of non seamless angle information NSML\_AGLI of drawing 10. To angle information (NSML\_AGLI), the start address (NSML\_AGL\_C#n\_DSTA) of the angle cell (the cell which constitutes a switch destination angle; AGL\_C#n) of a jump place is indicated only for the number #n of the multi-angle which constitutes angle iron so that it may illustrate.

[0145]Drawing 14 shows the contents of non seamless angle change cell jump place address NSML\_AGL\_Cn\_DSTA of drawing 13. This jump place address (NSML\_AGL\_C#n\_DSTA), With the number of relative logical blocks from the logical block of the navigation pack in which reproduction control information (PCI) is included. It is what described the start address of the video object unit (VOBU) in a jump place angle cell (AGL\_C#n), and has 32-bit (4 bytes) composition as shown in drawing 14.

[0146]Namely, 8 bits of low ranks of an angle cell (AGL\_C#n) comprise 1 byte of the beginning, 8+8 bits of middle of an angle cell (AGL\_C#n) comprise next 2 bytes, Top 7 bits of an angle cell (AGL\_C#n) comprise next 7 bits, and 1 bit (the 32nd bit) of the last is used as a location flag (AGL\_C location) of an angle cell.

[0147]The location flag (AGL\_C location) of an angle cell describes whether the jump place is arranged in front of the navigation pack (NV\_PCK) in which applicable reproduction control information (PCI) is included. That is, if a flag (AGL\_C location) is 0b (binary 0), it is shown that a jump place is after a navigation pack, and if it is 1b, it is shown that a jump place is before a navigation pack or the navigation pack itself.

[0148]Drawing 15 is a figure explaining how a non seamless angle change is made in the angle iron which comprises two or more multi-angle cells.

[0149]The reproduction (presentation) time of onset of the video object unit (VOBU) of the

above-mentioned jump tip cell is chosen at a reproduction start and the time (t20 of drawing 15) of VOB in which said reproduction control information (PCI) is included, and the time of onset (t10 of drawing 15) of VOB in front of that.

[0150]Although mentioned later, In the angle change seamless reproduction using the DSI data 115 of drawing 8. The reproduction (presentation) time of onset of the video object unit (VOB) of a jump tip cell is chosen as the regeneration time (t80 of drawing 21) of the head VOB in the interleaved unit immediately after making an angle change (t70 of drawing 21).

[0151]The angle cell (AGL\_C#i;i=1-n) controlled by the PCI data 113 can be changed in the unit (they are 0.4 second - 1.2 seconds at regeneration time) of the video object unit (VOB) 85, as shown in drawing 15. In drawing 15, sequence number #n is given to the video object unit (VOB) 85 according to reproduction sequence.

[0152]The angle cell (AGL\_C#i;i=1-n) in angle iron is arranged in parallel in the flow of regeneration time. In a relation with cells other than angle iron, the cell of angle iron is arranged in the flow of regeneration time at the cell of order, and series.

[0153]Here to the video object unit (VOB#n;n=1 or 2) 85 of other angle cells (AGL\_C#1 or AGL\_C#9) 84 corresponding to reproduction number #n (for example, n= 2) of a certain angle cell (AGL\_C#i). Another angle data (VOB#2) of the video object unit (VOB#2) 85 of reproduction number #2 and identical time (t20) or nearest another angle data (VOB#1) before it (t10) is stored.

[0154]For example, in a certain angle cell (AGL\_C#i) 84, it is assumed that continuation arrangement of video object unit VOB#n85 is carried out as a video data which operation of a series of pitching/blow projects by the complete view containing a pitcher and a batter. Continuation arrangement of video object unit VOB85 is carried out as a video data which only a batter projects on a screen in order to appreciate blow form in other angle cells (AGL\_C#1) 84, In the angle cell (AGL\_C#9) 84 of further others, only a pitcher's expression assumes that video object unit VOB85 is continuously arranged as a video data projected on a screen.

[0155]While you began, and viewing and listening to the video of angle cell #i (AGL\_C#i), the moment the batter hit the ball, suppose that the televiewer changed the playback angle into angle cell #1. That is, suppose that the reproduction angle was changed into the camera angle which only a batter projects the moment the batter struck. Then, an angle change is made, for example on the screen from just before a bat swing start from the screen after hitting a ball (the passage of the like [ 0.4 second -1.2 second ] time of less than is \*\*\*\*\* by one VOB).

[0156]If it is changed into angle cell #9 the moment the batter hit the ball during video viewing and listening of angle cell #i (AGL\_C#i), That is, if a reproduction angle is changed into only a pitcher's camera angle the moment the pitcher had the ball hit, the expression of the pitcher of the moment of being struck is displayed on a screen, and a mental change of a pitcher can be appreciated.

[0157]Specifically by description of such a start address (NSML\_AGL\_C#n\_DSTA) of an angle cell, the following angle change (the passage of the time on story development. \*\*\*\*\* discontinuous non seamless reproduction) is also realizable.

[0158]Here, after the pitcher A pitches in the game of baseball, the batter B strikes, and the non seamless angle change supposing a series of scenes until the hit ball serves as a home run is explained.

[0159]In drawing 15, each angle cell (AGL\_C#i;i=1-9) assumes that the batter B includes the video information which photoed the same event that carries out the home run of the pitcher's A pitching with various camera angle. For example, angle cell AGL\_C#1 includes the video

information from the camera installed in the first base side infield stands, Angle cell AGL\_C#i (for example, i= 5) presupposes angle cell AGL\_C#9 that the video information from the camera installed so that the batter A might be arrested over the pitcher's B back from a center is included including the video information from the camera installed in the backstop reverse side.

[0160]The televiewer (apparatus users) who is admiring DVD disk 10 which contains the above-mentioned angle cell (AGL\_C#i;i=5) with the playback equipment (DVD player) mentioned later, It gets to know that the present angle change is possible by blink of the angle mark etc. which are not illustrated, and suppose that the reproduction angle was changed from #5 to #9 using angle button 5ang and 5 t of number buttons (ten key) of the remote controller 5 (drawing 48 is referred to and it is the after-mentioned) which are mentioned later. (Then, the picture under reproduction at the moment that angle button 5ang is pushed, for example freezes, and a moving-image-reproduction state halts there.)

When the after televiewer pushes angle button 5ang and starts angle change reproduction (time t30 of drawing 15), the system CPU section of playback equipment (DVD player), With reference to the angle information (NSML\_AGLI) on drawing 13, the jump place address of cell-numbers #9 is gained (here start address of VOB#2). And the video information (VOB#2 or subsequent ones) of angle #9 recorded on DVD disk 10 is played from the time t20. (The screen of angle #5 which was being frozen till then changes to the screen of angle #9, and it goes into moving image reproduction.)

Now, supposing VOB#2 or subsequent ones of drawing 15 is a video data on and after the moment the batter's B bat hit the ball accurately, The image of the moment that a ball is accurately hit with the camera angle (#5) from the backstop reverse side changes to the image of the moment that a ball is accurately hit with the camera angle (#9) from a center, and a scene until a ball jumps into a stand from there is reproduced.

[0161]On the other hand, suppose that the televiewer changed the reproduction angle from #5 to #1 using angle button 5ang and 5 t of number buttons (ten key) of the remote controller 5.

[0162]When the after televiewer pushes angle button 5ang and starts angle change reproduction (time t30 of drawing 15), a playback equipment (DVD player) system CPU section, With reference to the angle information (NSML\_AGLI) on drawing 13, the jump place address of cell-numbers #1 is gained (here start address of VOB#1). And the video information (VOB#1 or subsequent ones) of angle #1 recorded on DVD disk 10 is played from the time t10. It is decided by which address the provider (software maker) of DVD disk 10 writes in into the information table of drawing 13 what a jump place address here will become.

[0163]Supposing VOB#1 or subsequent ones of drawing 15 is an image of a from just before the pitcher A throws a ball to the batter B, The image of the moment that a ball is accurately hit with the camera angle (#5) from the backstop reverse side changes to an image just before a pitcher throws a home run ball with the camera angle (#1) from first base infield stand. Then, the pitcher A can throw a ball from screen right-hand side, the batter B on the left-hand side of a screen can hit the ball, and the televiewer can see a scene until a hit ball is pierced in the right stand on the right-hand side of a screen.

[0164]If a former cell address is written in and put on NSML\_AGL\_C1\_DSTA of the information table of drawing 13 from VOB#of angle AGL\_C#1 1, another angle reproduction from the time t10 or before will also be attained with the change to angle #1 from angle #i. (In this case, reversion \*\*\*\* non seamless angle change can do time 1 second or more.)

the search operation of a bigger time basis may be substantially combined with angle change of a VOB unit for time with angle change at the time of reversion \*\*\*\*\*. For example, while

reproducing a certain angle cell (#5) in the video object (VOB\_IDN2) 83 of drawing 6, angle switching control is performed, It is possible to start reproduction from the camera angle of another angle cell (#9) in a video object (VOB\_IDN1) (if there is such a demand).

[0165]Anyway, in the example of drawing 15, regeneration time (passage of the time on story development) serves as discontinuous non seamless reproduction from reversion \*\*\*\*\* in time in front with an angle change.

[0166]Drawing 16 is a figure explaining data arrangement of data search information DSI of drawing 8. DSI packet 117 shown in drawing 8 contains the DSI data (DSIn) 115 which is navigation data for searching the video object unit (VOBU#n) 85, as shown in drawing 16.

[0167]Drawing 17 shows the contents of data search information DSI of drawing 16. As shown in drawing 17, the DSI data 115 32 bytes of DSI general information (DSI\_GI), 148 bytes of seamless reproduction information (SML\_PBI), and 54 bytes of angle information (SML\_AGLI) for seamless reproduction, 168 bytes of search information (VOBU\_SRI) for video object units and 144 bytes of synchronous reproduction information (SYNCI) are included.

[0168]Drawing 18 shows the contents of data search information general information DSI\_GI of drawing 17. As shown in drawing 18, the information about the DSI data 115 whole is described by DSI general information (DSI\_GI). that is, to DSI general information (DSI\_GI), the system time standard reference value (NV\_PCK\_SCR) of the introduction navigation pack 86 is indicated (SCR -- a system clock reference -- abbreviated).

[0169]This system time standard reference value (NV\_PCK\_SCR) is loaded to the system time clock (STC; not shown) built into the inside of the playback equipment (DVD player) mentioned later. On the basis of this STC, in playback equipment, a video pack, an audio pack, and a sub video image pack are decoded in video, an audio, and a sub video decoder part, respectively, and the image and sound which were decoded are played by the monitor section and a loudspeaker part.

[0170]To DSI general information (DSI\_GI). The place which described the address (start address) of the navigation pack 86 with which this DSI packet is contained as it is also at the number (RLBN) of relative logical blocks from the head of the logical block of the video object set 82 with which DSI packet 117 is contained, A navigation pack logical block number (NV\_PCK\_LBN) is indicated.

[0171]To DSI general information (DSI\_GI). The place which described that the address of the last pack in this video object unit 85 was also at the number (RLBN) of relative logical blocks from the head logical block of the video object unit 85 in which DSI packet 117 is contained, A video object unit end address (VOBU\_EA) is indicated.

[0172]To DSI general information (DSI\_GI). It has by the relative block count (RLBN) from the head logical block of the video object unit 85 on which DSI packet 117 was recorded, The place which described the address of the video packet 88 with which the final data of the first encoded reference picture (the first I picture) that comes after this DSI packet is recorded, The 1st reference picture end address (VOBU\_1 STREF\_EA) of a video object unit is indicated. When this video object unit 85 does not contain I picture (or a video data is not included), 00000000 h is written in this VOB\_1 STREF\_EA.

[0173]To DSI general information (DSI\_GI). It has by the relative block count (RLBN) from the head logical block of the video object unit 85 on which DSI packet 117 was recorded, The place which described the address of the video packet 88 with which the final data of the 2nd encoded reference picture (P picture; usually I picture or the first P picture) that comes after this DSI packet is recorded, The 2nd reference picture end address (VOBU\_2 NDREF\_EA) of a

video object unit is indicated. When this video object unit 85 does not contain the 2nd reference picture, 00000000 h is written in this VOBU\_2 NDREF\_EA.

[0174]To DSI general information (DSI\_GI). It has by the relative block count (RLBN) from the head logical block of the video object unit 85 on which DSI packet 117 was recorded, The place which described the address of the video packet 88 with which the final data of the 3rd encoded reference picture (P picture; usually I picture or 2nd P picture) that comes after this DSI packet is recorded, The 3rd reference picture end address (VOBU\_3 RDREF\_EA) of a video object unit is indicated. When this video object unit 85 does not contain the 3rd reference picture, 00000000 h is written in this VOBU\_3 RDREF\_EA.

[0175]The video object unit (VOBU) usually contains some glue PUOB picture (GOP). In this case, the above-mentioned 2nd and 3rd reference picture may belong to GOP(s) other than the glue PUOB picture (GOP) to which the 1st reference picture belongs. In that case, the boundary of a glue PUOB picture (GOP) is computed by the above-mentioned end address (VOBU\_2 NDREF\_EA and VOBU\_3 RDREF\_EA) straddling.

[0176]To DSI general information (DSI\_GI), the identification number (VOBU\_VOB\_IDN) of the video object 83 in which DSI packet 117 is contained is indicated.

[0177]To DSI general information (DSI\_GI), the identification number (VOBU\_C\_IDN) of the cell 84 in which DSI packet 117 is contained is indicated.

[0178]To DSI general information (DSI\_GI), the cell lapsed time (C\_ELTM) in the table of the reproduction-control-information general information (PCI\_GI) of drawing 11 and the cell lapsed time (C\_ELTM) of an identical content are indicated.

[0179]Drawing 19 is contents \*\*\*\* of seamless angle information SML\_AGLI of drawing 17. To the angle information (SML\_AGLI) for seamless reproduction on drawing 19, the same address of the jump place angle cell as the angle information (NSML\_AGLI) for non seamless reproduction on the PCI data 113 is indicated.

[0180]As shown in drawing 19, the seamless angle cell jump place (SML\_AGL\_Cn\_DSTA) only the number of selectable angles indicates the start address and cell size of an angle cell (AGL\_C#n) of a jump place to be to angle information (SML\_AGLI) is indicated. This SML\_AGL\_Cn\_DSTA comprises 48 bits (6 bytes), as shown in drawing 20.

[0181]In order to perform "an angle change by reproduction and jump" later mentioned with reference to drawing 29, the table of angle information as shown in drawing 19 is recorded in the DSI packet in the navigation pack 86.

[0182]The jump place information on the interleave unit ILVU reproduced next for every angle is recorded on this table.

[0183]Drawing 20 is what shows one of the seamless angle change cell jump place address SML\_AGL\_Cn\_DSTA described in the angle information table of drawing 19, The ILVU size which indicates the size of the angle reproduced at the next jump place of the angle number to be a jump place address which is 4 bytes of address information which shows the next jump place of the angle number is included.

[0184]Namely, the size of the jump place interleaved unit (ILVU) of an angle cell (AGL\_C#n) is shown by 2 bytes (16 bits of low ranks) of the beginning, The jump place address of an angle cell (AGL\_C#n) is shown by the next 31 bits, and arrangement of an angle cell, i.e., (AGL\_C location) of a location flag, is shown by 1 bit (b47 [ bit / 48th ]) of the last.

[0185]A location flag (AGL\_C location) here describes whether the jump place is arranged in front of the navigation pack (NV\_PCK) in which applicable data search information (DSI) is included. That is, if a flag (AGL\_C location) is 0b (binary 0), it is shown that a jump place is

after a navigation pack. Handling in particular in case it is 1b was not decided.

[0186]The angle information (SML\_AGLI) for seamless reproduction on drawing 19 is effective information only when an angle change is made seamlessly (only when the seamless angle change flag later mentioned with reference to drawing 27 stands). When this seamless angle change flag does not stand, angle change <TXFFR=0002 LY="0300" LX="1100" WI="080" HE="250" becomes non, are carried out seamlessly and effective [ the angle information (NSML\_AGLI) for non seamless reproduction on drawing 13 ] in that case.

[0187]The start address of the angle cell (AGL\_C#n) of the jump place shown in the jump place address of drawing 20 is described as follows. At namely, the time of the regeneration completion of the interleaved unit (ILVU#n-1) of a certain angle cell in which the DSI data 115 was contained. The start address of the interleaved unit (ILVU#n) of the angle cell (AGL\_C#n) which should be reproduced succeeding in the back, It is described that it is also at the number (RLBN) of relative logical blocks from the logical block of the navigation pack 86 in which this DSI data 115 is contained.

[0188]Here, an interleaved unit (ILVU#n) is a record unit at the time of carrying out interleave record of two or more angle cells (AGL\_C#n) which continued respectively when seeing from a viewpoint of the contents of a program alternately (into fragment) on the optical disc (DVD disk) 10 physically.

[0189]If this interleaved unit (ILVU#n) is made to correspond to the video object unit (VOBU) 85 of drawing 6, Interleave record of two or more one or more VOBUs (set of the video pack which constitutes VOBUs if it says finely) of each angle cell will be carried out on the track of DVD disk 10. (Incidentally each interleaved unit comprises one or more VOBUs.)

Drawing 21 is a figure explaining how a seamless angle change is made in the angle iron which comprises two or more multi-angle cells.

[0190]If the illustration of drawing 21 is taken for an example, angle cell AGL\_C#1 thru/or interleaved unit ILVU#1 of angle cell AGL\_C#9 will be physically arranged on the recording track of DVD disk 10 in order, Interleaved unit ILVU#2 of angle cell AGL\_C#1 thru/or angle cell AGL\_C#9 is arranged in order physically after that. Like the following, ILVU#3 of AGL\_C#1 - #9 is arranged, ILVU#4 of AGL\_C#1 - #9 is arranged after that, and it goes (each ILVU# comprises one or more VOBUs).

[0191]The angle cell (AGL\_C#i; i=1-n) in angle iron is arranged in parallel in the flow of regeneration time. In a relation with cells other than angle iron, the cell of angle iron is arranged in the flow of regeneration time at the cell of order, and series.

[0192]As mentioned above, the information (plurality VOBUs) on each angle cell (#1-#9) calls an interleaved block the portions of interleaved unit ILVU#1, #2, #3, and -- by which interleave record was carried out in the form at the fragment. And the interleaved unit ILVU of each angle cell AGL\_C#1 - AGL\_C#9. For example, regeneration time includes as a unit the video information which caught the same event like the same batter's home run scene with various camera angle for the video object unit (VOBU) for 0.4 second - 1.2 seconds.

[0193]When a change of an angle based on the seamless reproduction angle information (SML\_AGLI) shown in drawing 19 is made during reproduction of the above-mentioned interleaved block, the following operations are performed, for example.

[0194]Namely, as shown in drawing 21, The angle cell under present reproduction on which the DSI data 115 was recorded. The trace place of the optical pickup which is not illustrated to the interleaved unit (ILVU#3) of the jump place angle cell (AGL\_C#1 or #9) which continues immediately after the regeneration time (t60-t80) of the interleaved unit (ILVU#2) of (AGL\_C#i)

flies.

[0195]In the example of drawing 21, it becomes the seamless reproduction which continued in time from regeneration time flying to the time immediately after a cell change with an angle change (without reproduction motion breaking off).

[0196]When the above-mentioned angle change is not made, While reproducing the angle cell (AGL\_C#i) under interleaved block, the optical pickup which is not illustrated, Interleaved unit ILVU#1 of only the angle cell (AGL\_C#i), #2, #3, and -- are traced at intervals (ILVU#1 other than AGL\_C#i, #2, #3, and -- flying).

[0197]When the angle information (NSML\_AGLI) on PCI mentioned above was used, \*\*\*\*\* angle change was made in time per video object unit (VOBU) (0.4 second - 1.2 seconds), but, when the angle information (SML\_AGLI) on DSI is used, an angle is changed per interleave record (time interval beyond a VOB unit), and it is continuously changed into the scene of another (there is no reversion -- coming out) angle in time.

[0198]namely, the angle information (NSML\_AGLI) on reproduction control information (PCI) -- time -- discontinuity (seamless -- impossible) -- to having described angle change, to the angle information (SML\_AGLI) on DSI, angle change which continues in time (seamless -- possible) is described.

[0199]Here, seamless angle change is more concretely explained by making the game scene of baseball into an example. Angle cell AGL\_C#i is a stream of the video data which carried out the seriography of the scene from which the pitcher A pitches, the batter B hits the ball, and the hit ball serves as a home run from the infield stands here, Angle cell AGL\_C#1 presupposes that it is the video-data stream which photoed the same scene from the outfield bleachers. Angle cell AGL\_C#9 presupposes that it is the video-data stream which photoed the signs of the team that the batter B belonged about the same scene.

[0200]if the televiewer who is appreciating angle cell AGL\_C#i changes into angle cell AGL\_C#1 (scene from the outfield bleachers) now the moment the batter B hit the ball, a hit ball will fly to the outfield continuously in time from immediately after the batter's B blow (to the televiewer side) -- it changes to a screen. (A screen is not made to freeze in the middle of a change)

If it changes into angle cell AGL\_C#9 the moment it was appreciating angle cell AGL\_C#i first and the hit ball became a home run, it will change to the angle which the signs of a team that the batter B belongs project. Then, the situation of a team and a supervisor's expression which were making a great uproar with the home run are displayed on a screen.

[0201]Thus, by using suitably the angle information (NSML\_AGLI) on the PCI data 113, and the angle information (SML\_AGLI) on the DSI data 115 properly, reappearance of a multi-angle scene which is clearly different on feeling for a televiewer is attained.

[0202]Although the talk changes here, There are four kinds, the first play PGC (FP\_PGC), the video manager menu PGC (VMGM\_PGC), the video title set menus PGC (VTSM\_PGC), and the title PGC (TT\_PGC), of program chains (PGC).

[0203]Although these program chains (PGC) usually comprise program chain information (PGCI) and one or more video objects (VOB; one or more cells are included, respectively), There may also be a program chain (PGC) of only program chain information (PGCI) without a video object. The program chain (PGC) of only program chain information (PGCI) is used, when determining a reproduction condition and transferring the management of reproduction to other program chains.

[0204]The number of program chain information (PGCI) is assigned from 1 in order of the

description of a PGC search pointer. The number of program chains (PGC) becomes the same as the number of program chain information (PGCI). Even when a program chain takes a block structure, the number of program chains (PGC) within a block is in agreement with the consecutive number of a PGC search pointer.

[0205]Drawing 22 is a figure explaining the composition of program-chain-information PGCI contained in the video title set information VTSI on drawing 5.

[0206]Program chain information (PGCI) has structure as shown in drawing 22. Namely, program chain information (PGCI), Program chain general information (PGC\_GI; indispensable), a program chain command table (PGC\_CMDT; option), A program chain programmed map (PGC\_PGMAP; indispensable, when following C\_PBIT exists), It is constituted by the cell reproduction information table (C\_PBIT; option) and the cell position information table (C\_POSIT; indispensable, when said C\_PBIT exists).

[0207]each video title set (VTS#1, VTS#2, --) 72 shown in drawing 5 -- each program chain information (VTS\_PGCI) is included in video title set information VTSI94.

[0208]Drawing 23 is a figure explaining the contents of the program chain general information (PGC\_GI) included in program-chain-information PGCI of drawing 22.

[0209]As shown in drawing 23, to program chain general information (PGC\_GI). The contents (PGC\_CNT) of the program chain, and the regeneration time (PGC\_PB\_TM) of a program chain, The user's operation control information (PGC\_UOP\_CTL) on a program chain, The control table (PGC\_AST\_CTLT) of a program chain audio stream, The control table (PGC\_SPST\_CTLT) of a program chain auxiliary video stream, The navigated control information (PGC\_NV\_CTL) on a program chain, The sub video image palette (PGC\_SP\_PLT) of a program chain, The start address (PGC\_CMDT\_SA) of the command table of a program chain, The start address (PGC\_PGMAP\_SA) of the programmed map of a program chain, The start address (C\_PBIT\_SA) of the reproduction information table of the cell in a program chain and the start address (C\_POSIT\_SA) of the position information table of the cell in a program chain are indicated.

[0210]The contents (PGC\_CNT) of the program chain show the number of programs and the number of cells (a maximum of 255) in the program chain. The number of programs is set to "0" in a program chain without the video object VOB.

[0211]the regeneration time (PGC\_PB\_TM) of a program chain -- the sum total regeneration time of the program in the program chain -- time and a part -- a second -- and -- video -- a frame number -- being shown . The flag (tc\_flag) which shows the type of a video frame is also described by this PGC\_PB\_TM, and a frame rate (per second 25 frames or per second 30 frames) etc. are specified by the contents of this flag.

[0212]The user's operation control information (PGC\_UOP\_CTL) on a program chain shows the user's operation forbidden in the program chain under reproduction (among those, \*\* is later mentioned with reference to drawing 24).

[0213]The control table (PGC\_AST\_CTLT) of a program chain audio stream can include the control information on each eight audio stream. The conversion information on the audio stream number decoded from the flag (availability flag) and audio stream number which show whether the audio stream of such control information on each is available within an applicable program chain is included.

[0214]The control table (PGC\_SPST\_CTLT) of a program chain auxiliary video stream, The conversion information on the flag (availability flag) which shows whether the auxiliary video stream is available within an applicable program chain, and the auxiliary video stream number

decoded from an auxiliary video stream number (32 pieces) is included.

[0215]The navigated control information (PGC\_NV\_CTL) on a program chain, Next\_PGCN which shows the program chain number which should be reproduced to the next of the program chain under present reproduction, Previous\_PGCN which shows the program chain number (PGCN) quoted by a navigation command "LinkPrevPGC" or "PrevPGC\_Search()", GoUp\_PGCN which shows the program chain number which should be carried out a return from the program chain, PG Playback mode which shows the reproduction modes (sequential reproduction, random reproduction, shuffle reproduction, etc.) of a program, and Still time value which shows the still time after reproduction of the program chain are included.

[0216]The sub video image palette (PGC\_SP\_PLT) of a program chain has described the luminance signal of 16 sets and two color-difference signals which are used by the auxiliary video stream in the program chain.

[0217]The start address (PGC\_CMDT\_SA) of the command table of a program chain is the descriptor area for PURIKO mand (it performs before PGC reproduction), a post command (it performs after PGC reproduction), and a cell command (it performs after cell reproduction).

[0218]The start address (PGC\_PGMAP\_SA) of the programmed map of a program chain, The relative address from the byte of the beginning of program-chain-information PGCI describes the start address of programmed map PGC\_PGMAP which shows the composition of the program in the program chain.

[0219]The start address (C\_PBIT\_SA) of the reproduction information table of the cell in a program chain, The relative address from the byte of the beginning of program-chain-information PGCI describes the start address of cell reproduction information table C\_PBIT which determines the reproduction sequence of the cell in the program chain.

[0220]The start address (C\_POSIT\_SA) of the position information table of the cell in a program chain, The relative address from the byte of the beginning of program-chain-information PGCI describes the start address of cell position information table C\_POSIT which shows the VOB identification number and cell identification number which are used within the program chain.

[0221]Drawing 24 is a figure explaining the contents of the program chain user's operation control (PGC\_UOP\_CTL) included in program chain general information PGC\_GI shown in drawing 23.

[0222]This program chain user's operation control information (PGC\_UOP\_CTL) shows the user's operation forbidden in the program chain under reproduction. This user's operation control PGC\_UOP\_CTL comprised 4 bytes (32 bits), and has determined the propriety of the specific operation in PGC under reproduction by the user's operation inhibit flags UOP0-UOP3 contained in it, and UOP5-UOP24.

[0223]That is, by each user's operation prohibition flag bit (UOP0-UOP3;UOP5-UOP24), when the contents of a bit are 0b, it is shown that corresponding user's operation is permitted, and when the contents of a bit are 1b, it is shown that corresponding user's operation is forbidden.

[0224]The provider (software maker) of DVD disk 10, By the contents (several kinds the contents of a bit of UOP) of the above-mentioned user's operation control information (PGC\_UOP\_CTL). For example, a user calls a menu and it can avoid flying during reproduction of specific PGC of a certain title to other titles (in this case, it can set up so that a menu call / title-numbers selection may be attained after finishing reproducing that PGC). Or a rapid traverse can be forbidden during specific PGC reproduction (if the PGC is a preview of the movie of for example, a series thing, unless a user stops playback equipment, a user can be made to look at all the previews).

[0225]Drawing 25 shows the contents of cell reproduction information table C\_PBIT of drawing 22. This cell reproduction information table C\_PBIT has composition as shown in drawing 25, and includes a maximum of 255 cell reproduction information (C\_PBI#;#n=#1-#255).

[0226]Drawing 26 is a figure explaining the contents of cell reproduction information C\_PBI of drawing 25. Each cell reproduction information (C\_PBI#) shown in drawing 25, As shown in drawing 26, a cell category (C\_CAT;4 byte), cell regeneration time (C\_PBTM;4 byte), The start address of the video object unit (VOBU) of the beginning in a cell (C\_FVOBU\_SA;4 byte), The end address of the interleaved unit (ILVU) of the beginning in a cell (C\_FILVU\_EA;4 byte), The start address (C\_LVOBU\_SA;4 byte) of the last video object unit (VOBU) in a cell and the end address (C\_LVOBU\_EA;4 byte) of the last video object unit (VOBU) in a cell are included.

[0227]Drawing 27 is a figure explaining the contents of cell category C\_CAT of drawing 26. A cell category (C\_CAT) shows the number of cell commands in 8 bits (b0-b7) of low ranks, as shown in drawing 27, The following 8 bits (b8-b15) show cell still time, and the following 5 bits (b16-b20) show a cell type (for example, is it karaoke?), The following 1 bit (b21) shows an access-restriction flag, and the following 1 bit (b22) shows cell reproduction mode (for example, are they an animation or a still?), Fly a request-to-print-out-files bit, and the following 1 bit (b24) shows a seamless angle change flag, The following 1 bit (b25) shows the discontinuous flag (is STC reset or not?) of system time clock STC, The following 1 bit (b26) shows an interleave arrangement flag (is the cell specified by C\_PBI a thing in a contiguous block, and is a thing under interleaved block?), the following 1 bit (b27) showing a seamless reproduction flag (should seamless reproduction of the cell specified by C\_PBI be carried out or not?), and a cell block type (for example, -- do angle iron or not?) at the following 2 bits (b28-b29), [ show and ] 2 bits (b30-b31) of the last show cell block mode (for example, the beginning within a block -- do cell or not?).

[0228]Cell block mode shows here that it is not a cell within a block at the time of 00b (b is binary mind), When it is 01b, it is shown that it is a cell of the beginning within a block, when it is 10b, it is shown that it is a cell under block, and when it is 11b, it is shown that it is a cell of the last within a block.

[0229]When a cell block type is 00b, it is shown that it is not a part of corresponding block, and when it is 01b, it is shown that a corresponding block is angle iron (block containing the cell of multi-angle).

[0230]When this cell block type is not 01b, by title [ containing a multi-angle cell ] being under reproduction, For example, the angle mark which is not illustrated is supposed that the light is switched on (the display to some of corners of TV monitor display, navigational panels of the main part of playback equipment, and some remote controls of playback equipment is possible for this angle mark).

[0231]On the other hand, if this cell block type =01b is detected during reproduction, blink (or change of a lighting color or change of the form of an angle mark) of the angle mark which is not illustrated can inform a televiewer of it present angle iron being under reproduction. Thereby, the televiewer can know now that the image restoration of another angle is possible about the image under reproduction.

[0232]At this time, the multiple-pictures digest display of each angle image may be performed automatically (cell block type = when 01b is detected).

[0233]It is shown that an applicable cell is a thing in a contiguous block (continuous recording of two or more VOBUs is carried out) when an interleave arrangement flag is 0b, When an interleave arrangement flag is 1b, it is shown that an applicable cell is a thing under interleaved

block (interleave record of the ILVU in which each contains one or more VOBUs) is carried out).

[0234]When the seamless angle change flag stands (=1b), it is shown that an applicable cell is an object of seamless reproduction, and when this flag does not stand (=0b), it is shown that an applicable cell is an object of non seamless reproduction.

[0235]Namely, it will be in the state which can be seamless angle changed by interleave arrangement flag =1b at the time of seamless angle change flag =1b, and will be in the state which can be non seamless angle changed at the time of seamless angle change flag =0b.

[0236]If the very early media drive system (the system which can access the head of the angle iron of the request of less than one frame period of video; it does not necessarily limit to an optical disk drive system) of access time is used, interleave arrangement flag =0b, That is, also between the sets (separate angle cell) of VOBUs by which interleave record is not carried out, a smooth angle change is realizable.

[0237]When the optical disc 10 with a comparatively slow access speed is used as an archive medium, it is good to assign a part for 1 round of recording tracks of the disk to record for one interleaved block. Then, as for the trace place of an optical head, the track jump (it is suitable for seamless angle change) of a disk which does not almost have a time lag since what is necessary is just to move slightly by one track radially becomes possible at the time of the jump (angle change) during a contiguity interleaved block. In this case, when the track jump for one video object unit (VOBU) is carried out, the time lag for one rotation of the maximum and a disk may arise. Therefore, the angle change accompanied by the jump of a VOBUs unit is suitable for non seamless angle change.

[0238]Here, the contents of the seamless angle change flag are usually beforehand determined by the provider (software maker who makes the contents of a program of each title recorded on DVD disk 10). That is, a provider can decide to use [ whether to use non seamless angle change of drawing 15, or ] seamless angle change of drawing 21 uniquely by deciding the contents of the seamless angle change flag beforehand.

[0239]However, after reading the cell data of an applicable tight recette in an optical disc, it is technically possible to constitute hardware so that a televiewer (apparatus users) can change arbitrarily the contents of the seamless angle change flag in read data.

[0240]Since a seamless angle change flag is a flag with which the angle information indicated in the navigation pack 86 shows a seamless angle or a non seamless angle, For example, when the user of a DVD VCR changes this flag, the necessity of correcting the angle information in the navigation pack 86 (for example, change to non seamless angle information from seamless angle information) comes out.

[0241]When cell reproduction mode is 0b, carrying out continuous reproduction within a cell is shown, and when it is 1b, carrying out still playback by each VOBUs which exists in a cell is shown.

[0242]An access-restriction flag can be used when forbidding selection by user's operation directly. For example, a user can be forbidden from eating the reply in question secretly by setting to 1b the access-restriction flag of a cell with which the reply of the collection of problems was recorded.

[0243]The cell type can show the following according to the 5-bit contents, when the applicable cell is created for karaoke, for example.

[0244]Namely, if it is 00000b, specification of a cell type is not made, but if it is 00001b, the title image of karaoke is specified, If it is 00010b, the intro of karaoke is specified, and if it is

00011b, singing parts other than a climax (rust) are specified, If it is 00100b, the singing part of the 1st climax is specified, and if it is 00101b, the singing part of the 2nd climax is specified, If it is 00110b, the singing part of male vocal is specified, and if it is 00111b, the singing part of female vocal is specified, If it is 01000b, the singing part of man-and-woman mixed-voices vocal is specified, and if it is 01001b, an interlude (performance of only musical instrument) portion is specified, If it is 01010b, the fade-in of an interlude is specified, if it is 01011b, the fade-out of an interlude is specified, if it is 01100b, the 1st ending playing portions are specified, and if it is 01101b, the 2nd ending playing portions are specified. The contents of the five remaining bit codes can be used for other uses.

[0245]Angle change is applicable also to angle change of the background video of karaoke. returning seamlessly in front the whole body image of the singer who sings guide vocal, the rise image of a face, the rise image of the month, etc. for a while in accordance with the flow of karaoke music -- non -- a televiewer angle-change-keeps wished during the repeat playback between request vibrant tunes further seamlessly.

[0246]When the contents of 8 bit of the cell still time of drawing 27 are 00000000b, It is specified that it is not a still, when it is 11111111b, a still without the time limit is specified, and when it is 00000001b-11111110b, the still display of the length which carried out the second numeral of the decimal number (1-254) specified by these contents is specified.

[0247]The number of cell commands shows the number of commands which should be performed at the time of the end of reproduction of an applicable cell.

[0248]Drawing 28 is a figure explaining restriction of the seamless reproduction in angle iron.

[0249]The seamless reproduction flag in drawing 27 and a system time clock STC discontinuous flag take contents as shown in drawing 28 according to a cell reproduction state. That is, if the last cell is a cell in angle iron and the present cell is an independent cell, a seamless reproduction flag and an STC discontinuous flag will be set to "1" and "1", respectively. Also when the last cell is an independent cell and the present cell is a cell in angle iron, a seamless reproduction flag and an STC discontinuous flag are set to "1" and "1", respectively. (It is got blocked, and since a block is usually changed to angle iron, "1" stands on a discontinuous flag.)

On the other hand, if the last cell and the present cell are cells in angle iron, a seamless reproduction flag and an STC discontinuous flag will be set to "1" and "0", respectively. (It is got blocked, since angle iron is not changed as it is, a discontinuous flag does not stand, but this discontinuous flag is set to "0".)

If the above-mentioned discontinuous flag is active (flag = "1"), it will be judged with a system time clock (STC) being discontinuous (this judgment can be performed during the vertical blanking period of a main video signal). If this discontinuous judging is made, the comparison result of a presentation time stamp (PTS) and STC will be disregarded, and the present display control will be maintained. In the meantime, the counting operation of a subtimer will also be maintained and the newest system clock reference (SCR) will be set up about a main timer.

Then, it becomes being the same as that of ordinary reproduction until the next angle change is performed.

[0250]Drawing 29 is a figure which illustrates an example of the angle change performed with the playback equipment (DVD player) mentioned later (when seamless). Drawing 29 shows the relation with the angle by which change playback is carried out with the pack string read from DVD disk 10, and has illustrated the case where three angles exist here.

[0251]On the drawing 29 upper row, the video object unit VOB is constituted considering from the navigation pack (NV pack) as a control pack to the pack in front of the following NV pack as

a unit of reproduction and control. Non seamless angle reproduction is performed considering this VOB as a unit. On the other hand, the interleaved unit ILVU comprises one or more VOB(s), and is used as a unit of seamless angle reproduction.

[0252]In the drawing 29 middle, the cell data for seamless multiangle reproduction (AGL\_C# of drawing 21 fairly), It is arranged in order of angle #1 (AGL1-1 - AGL1-n), angle #2 (AGL2-1 - AGL2-n), and angle #3 (AGL3-1 - AGL3-n), and these angle #1 - #3 are summarized as angle iron (interleaved block).

[0253]In a seamless angle change, a reproduced image must not break off with an angle change. In order to prevent the picture way piece accompanying an angle change, interleave arrangement of the data (ILVU) of each angle is carried out like AGL1-1, AGL2-1, and AGL3-1/AGL1-2 and AGL2-2 and AGL3-2/AGL1-3 --.

[0254]Thus, angle data is divided into a comparatively small unit (ILVU), mutual arrangement is carried out, and it records on the recording track (drawing 2) of DVD disk 10 physically. If it does so, when an angle change is performed, the physical interval which the optical pickup (not shown) of a disk drive part jumps can be made small.

[0255]For example, when an angle change is seamlessly carried out to the angle 3 during reproduction of the angle 2 (AGL2-2) in the drawing 29 middle - the lower berth, The interval which the optical pickup which is not illustrated must jump physically can be managed with a part (AGL3-2, AGL1-3, and AGL2-3) for three of an interleaved unit (as shown in drawing 21, when the number of refreshable angles is a maximum of nine pieces, a jump interval is the maximum, and they are nine ILVU(s)). If it is a jump interval (they are nine ILVU(s) at the maximum) of this level, while reproducing the image after the MPEG decoding stored in the MPEG buffer memory (not shown) of playback equipment, It is technically possible to constitute so that an optical pickup may complete an angle change jump and may start the data read of a new angle.

[0256]Namely, by packing each interleaved unit ILVU as angle iron in order of angle #1, angle #2, and angle #3, and carrying out interleave arrangement, What it prevents a reproduced image breaking off at the time of an angle change for (that is, an angle change is performed seamlessly) becomes possible with a practical use level.

[0257]The seamless angle switching operation in the example illustrated to drawing 29 is explained a little more concretely.

[0258]The drawing 29 middle shows the case where angle #2 is chosen as an initial value. As a result, within the interleave block of drawing 29, 1st angle #1 (AGL1-1) will be skipped, it will jump at the head of 1st angle #2 (AGL2-1), and 1st angle #2 (AGL2-1) will be reproduced. 1st angle #3 (AGL3-1) and 2nd angle #1 (AGL1-2) will be skipped similarly, it will jump at the head of 2nd angle #2 (AGL2-2), and 2nd angle #2 (AGL2-2) will be reproduced.

[0259]The drawing 29 lower berth shows the reproduction state of the angle selected in the drawing 29 middle. While reproducing 2nd angle #2 (AGL2-2) now, suppose that the angle switching request of angle #3 occurred. In this case, as shown in the drawing 29 middle, it will jump to 2nd angle #2 (AGL2-2) to 3rd angle #3 (AGL3-3), and 3rd angle #3 (AGL3-3) will be reproduced.

[0260]Thus, the optical pickup of a disk drive part repeats reproduction and a jump by making ILVU of each angle into a unit, and reproduction of a predetermined angle and a seamless angle change are performed.

[0261]In order to perform the angle change by repetition of this reproduction and a jump, the angle information table as shown in drawing 19 is recorded on DSI packet 117 (drawing 16) in

the NV pack 86. The jump place address and size information of ILVU which are reproduced next for every angle are recorded on this table.

[0262]One (SML\_AGL\_Cn\_DSTA) of the angle information tables of drawing 19 has composition as shown in drawing 20, and A jump place address (4 bytes of address information which shows the next jump place of the angle number), The size of the angle reproduced at the next jump place of the angle number is included.

[0263]In the example of a seamless angle change of drawing 29, not changing to 2nd angle #2 (AGL2-2) to 2nd angle #3 (AGL3-2) immediately is based on the following Reason. That is, the two above-mentioned angles (AGL2-2 and AGL3-2) constitute the angle iron reproduced in the same time zone. Although the unit of a seamless angle change is each ILVU which constitutes an angle reproduction unit, the flow of moving image reproduction serving as discontinuity (non -- seamless) in time, and, if an angle change is performed between ILVU(s) of the same time zone (ILVU of AGL2-2, and ILVU of AGL3-2), Unless it becomes the following angle iron (AGL3-3), the seamless angle change which continued in time cannot be performed. For this reason, it changes to 2nd angle #2 (AGL2-2) to 2nd angle #3 (AGL3-2) immediately.

[0264]Drawing 30 is a key map which shows the composition of the menu used with the playback equipment mentioned later, and illustrates correspondence with a system menu and a user's operation function. It divides roughly into the menu (what pops up suitably on the screen of a monitor section) used with playback equipment, and there are a title menu, video title set menus, and an optional menu in it. Before long, the call of each menu in video title set menus is performed based on the contents of menu ID.

[0265]That is, if there is a menu call first, the program chain for route menus of menu ID=0011b will be called. Then, when displaying an audio menu, the program chain for audio menus of menu ID=0101b is called, When displaying a sub video image menu, the program chain for sub video image menus of menu ID=0100b is called, When displaying an angle menu, the program chain for angle menus of menu ID=0110b is called, When displaying a par TOOBU title (chapter) menu, the program chain for par TOOBU title menus of menu ID=0111b is called.

[0266]When the user (televviewer) of playback equipment makes an angle change, the program chain for angle menus of menu ID=0110b is called suitably, and an angle menu is displayed on a monitor section. In addition, an angle change may be made, without taking out an angle menu to a monitor section. In that case, in order to notify a televviewer of which angle is reproduced now, the angle number under present reproduction is displayed on the display panel of the whole surface of a playback equipment main part which is not illustrated, for example.

Drawing 31 is a figure explaining the menu in which a user does selection setting of the reproducing permission/the reproduction inhibit of a specific angle among the multi-angle video information played from DVD disk 10.

[0267]Now, suppose that the user pressed the setup key 5y of the remote controller 5 (the details refer to drawing 48 and are the after-mentioned). In this case, the system CPU section of playback equipment detects a selectable angle number (a maximum of 9) with reference to the angle information (refer to drawing 13 or drawing 19) recorded on DVD disk 10. If the detected angle number is #1-#7, the number of angles which can be changed will be a maximum of seven pieces. in this case, a system CPU section -- the OSD section (drawing 51 is referred to and it is the after-mentioned) in playback equipment -- angle number #1-#7 -- generation of the menu which sets up each reproducing permission/prohibition is directed.

[0268]Video manager information VMGI75 of drawing 5, Although not illustrated, video manager information management table VMGI\_MAT, title search pointer table TT\_SRPT, and

other information are included, and angle information (the selectable number of angles) is described by this title search pointer table TT\_SRPT.

[0269]The OSD section in playback equipment reads the data of a reproduction angle selection menu which is illustrated from ROM which is not illustrated to drawing 31. By making into a background a blue screen (or video screen read from DVD disk 10), this menu appears in a monitor section and draws.

[0270]In the menu screen shown in drawing 31, a user, Angle selection of angle number #1 currently suitably recorded on DVD disk 10 by operation \*\*\*\*\* in the upward Mark Misumi portion (cursor \*\*) of the cursor key 5q of the remote controller 5 or the downward Mark Misumi portion (cursor \*\*) - #7 can be performed. In this cursor operation, highlighting of the angle number chosen now is carried out by display-in-white processing or change of a color and contrast (at drawing 31, angle number #3 is chosen now and that number is illustrated by scattered shading).

[0271]If the enter key 5s of the remote controller 5 is pressed when the OSD display of the menu screen shown in drawing 31 is carried out, the toggle change of the highlighting of permission/prohibition of the angle reproduction state of the angle number (drawing 31 #3) chosen now will be carried out. For example, if the enter key 5s is once pressed in the graphic display state of drawing 31, a highlighting portion (scattered shading portion in a figure) will change from the position to the position of "permission" of "prohibition", and if the enter key 5s is pressed once again, a highlighting portion will return from the position of "permission" to the position of "prohibition."

[0272]If a selection angle number position is changed by the cursor key 5q after deciding desired reproducing permission/prohibited state by the above enter key operations, The selective state of the portion (scattered shading portion) which carried out highlighting by enter key [ 5s ] toggle switching control is become final and conclusive, and it changes to highlighting (slash shading) with the another portion (for example, it becomes like slash shading of angle number #5).

[0273]When a user sets up the above-mentioned reproducing permission/prohibited state about all of selectable angle number #1 - #7, it comes to be shown, for example in drawing 31. Here, it becomes an angle number which angle number #1, #2, #4, and #7 can actually reproduce among selectable angle number #1 - #7, Even if the angle of angle number #3, #5, and #6 is recorded on the angle iron of DVD disk 10, the mask of it is carried out at the time of playback execution, and it becomes as [ play / with a DVD player ].

[0274]For example, in the angle iron of the DVD video in which classic orchestra was mentioned, Angle #1 is the long shot which caught the whole orchestra from the audience side (a conductor's back side) of a concert, Angle #2 is the up shot which caught the conductor's face from the orchestra side, Angle #3 is the long shot which arrested the audience of the concert from the orchestra side, Angle #4 is the middle shot which caught the 1st violin group from the audience side, Angle #5 is the middle shot which caught the viola - the contrabass group from the audience side, and it is the middle shot angle #6 realized the wind instrument group to be from the audience side, and suppose that it is the up shot angle #7 realized the percussion instrument group to be from the audience side.

[0275]When reproducing the angle iron of the above-mentioned orchestra, in a default, the user (viewer) can view and listen also to the angle of angle #1 - #7 throat selectively. After setting up a reproduction angle selection menu as shown in drawing 31, the audience of angle #3, the viola of angle #5 - a contrabass group, and the wind instrument group of angle #6 are chosen, and it becomes impossible however, to reproduce (it is got blocked and the mask of angle #3, #5,

and #6 is carried out).

[0276]In this case, the whole orchestra of angle #1, the conductor of angle #2, the 1st violin group of angle #4, and the percussion instrument group of angle #7 serve as a refreshable angle. Auto angle reproduction for which these refreshable angles (#1, #2, #4, #7) are mentioned later (during reproduction of the angle iron on which multi-angle information was recorded) boil a reproduction angle variously automatically, change it and perform multiangle reproduction -- or a multiple-pictures simultaneous display (multi-angle digest display) comes to be performed.

[0277]When a user does not set up reproduction inhibit in particular with the playback angle selection menu of drawing 31, default configuration of all the angles of angle number #1 recorded on the angle iron of DVD disk 10 - #7 is carried out so that it may be in a reproducing permission state.

[0278]Drawing 32 is a figure explaining the flag set holding the result set up with the menu of drawing 31.

[0279]The result which the user set up in the reproduction angle selection picture shown in drawing 31 is set as the 9-bit flag set corresponding to an angle number as shown in drawing 32 by the angle number determination part (506 of drawing 63) inside system CPU of playback equipment. This flag set is stored in internal RAM or EEPROM prepared separately of playback equipment, etc.

[0280]When the auto angle reproduction (change a reproduction angle automatically and reproduce angle iron) or the multi-angle digest display (simultaneous reproduction should be carried out on two or more viewing areas by which each refreshable angle image was divided small) mentioned later is performed, The flag set in this internal RAM is referred to. And it will be reproduced while only the angle (that is, a flag, angle of a bit "0") of the angle number which does not stand as for the inhibit flag (bit "1") is changed [ that it is various and ] (or all at once).

[0281]All the intact angle corresponding points (at the example of drawing 31, it is angle #8 and angle #9) of the flag set of drawing 32 are made into the prohibited state (bit "1"). These processings can be performed by the angle number determination part (506 of drawing 63) mentioned above.

[0282]Drawing 33 is a flow chart explaining the operation which sets up each flag of the flag set of drawing 32 via the menu of drawing 31.

[0283]A user's push of the setup key 5y of the remote controller 5 (drawing 48) will carry out the OSD display of the selections (not shown) of various set menus to the monitor section 6 of playback equipment (drawing 45 - drawing 47, drawing 63 - drawing 64). If a reproduction angle selection menu is chosen among the displayed set menus by cursor key operation and enter key operation of the remote controller 5, the OSD display of the reproduction angle selection menu as shown in drawing 31 will be carried out to the monitor section 6.

[0284]Or the reproduction angle selection menu (OSD) of drawing 31 can also be called by 1 action by pressing simultaneously angle key 5ang and the menu screen key 5n of the remote controller 5. If it goes into this state, processing of drawing 33 will be started.

[0285]First, the system CPU section of playback equipment detects a selectable angle number (a maximum of 9) with reference to the angle information (drawing 13 or drawing 19) recorded on DVD disk 10. If the detected angle number is #1-#7, the number of angles which can be changed will be a maximum of seven pieces. In this case, the CPU section of playback equipment acquires number  $AGL_{max}$  of angles =7 (step ST10).

[0286]After the selectable number of angles ( $AGL_{max}=7$ ) becomes clear, initial setting ( $AGLN=1$ ) of the angle number  $AGLN$  which becomes active first by the menu screen of

drawing 31 is made (step ST12). By this initial setting, angle number #1 of drawing 31 becomes active.

[0287]Unless a user sets reproduction of a specific angle as prohibition with the menu of drawing 31, all the angle #1 - #7 are selectable in the beginning. On the other hand, since the case where reproduction object angle iron contains only seven angles is assumed, angle #8 and #9 are unreproducible.

[0288]Since the flag of the unreproducible angle is made into the bit "1", if the contents of the reproduction angle permission / inhibit flag set AGL\_flag in this case (drawing 32) are put in order toward the 1st bit from the 9th bit, initial setting of them will be carried out to "110 million" (step ST14).

[0289]Next, initial value AGL\_flag[ of selectable number AGLmaxof angles =7, setting-out angle number initial value AGLN=1, and reproduction angle permission / inhibit flag set ] = "110 million" is referred to, The OSD display of the reproduction angle selection menu as shown in drawing 31 is carried out (step ST16), and it serves as keystroke waiting from a user (step ST18).

[0290]Since initial setting of the angle number AGLN is carried out to "1" by step ST12, the number "1" is highlighted at first (drawing 31 has illustrated the case where the angle number "3" is highlighted).

[0291]A user's push of the "\*\*\*" key of the cursor key 5q of the remote controller 5 once will \*\*\*\*\* the one angle number AGLN which becomes active (step ST22). (step ST20 yes) In this case, it is set to AGLN=2, and highlighting of the angle number "2" of drawing 31 is carried out, and it becomes active. If the "\*\*\*" key is pressed repeatedly and AGLN which it \*\*\*\*\*ed exceeds AGLmax=7, AGLN will return to "1."

[0292]If a user does not press the "\*\*\*" key of the cursor key 5q of the remote controller 5 (step ST20 no) but presses the "\*\*\*" key once (step ST24 yes), one decrement of the angle number AGLN which becomes active will be carried out (step ST26). If the "\*\*\*" key is pressed at the time of AGLN=1, it will be set to AGLN=0, but in that case, it is set to AGLmax=7, highlighting of the angle number "7" of drawing 31 is carried out, and AGLN becomes active. Whenever the "\*\*\*" key is pressed repeatedly and AGLN by which the decrement was carried out is set to AGLmax=0, AGLN returns to AGLmax=7.

[0293]By the "\*\*\*" key of the cursor key 5q of the remote controller 5, or the "\*\*\*" key, if the enter key 5s of the remote controller 5 is pressed in the state of *Perilla frutescens* (L.) Britton var. *crispa* (Thunb.) Decne. as it is active (step ST28 yes), for example, the angle number "3", The contents of the flag bit corresponding to an angle number "3" are reversed from 0 to 1 (step ST30). If same operation is performed to an angle number "5" and "6", the contents of a bit of reproduction angle permission / inhibit flag set AGL\_flag will be set to "110110100" as shown in drawing 32. Thereby, in subsequent auto angle reproduction, an angle number "1", "2", "4", and "7" can become a reproduction object now.

[0294]If setting out of the reproduction angle selection menu of drawing 31 becomes as desired [ a user ], a user will push end key 5end of the remote controller 5 of drawing 2 (step ST32 yes). Then, processing of drawing 33 is ended.

[0295]Pressing simultaneously angle key 5ang and the menu screen key 5n of the remote controller 5 can also terminate processing of drawing 33.

[0296]Drawing 34 is a flow chart explaining the 1st example (auto angle by a random number generation) of an angle automatic change.

[0297]If the reproduction key 5c of the remote controller 5 is pressed after a reproduction object

angle number is determined by processing of drawing 33, playback of DVD disk 10 will be started. And if a reproduction part goes into the angle iron of drawing 15 or drawing 21, the CPU section of playback equipment will acquire the number of angles in the angle iron (the example of drawing 31 seven pieces) (step ST40).

[0298]After acquiring number AGLmax of angles =7 of the angle iron to be reproduced from now on, the CPU section of playback equipment acquires reproduction angle permission / inhibit flag set AGL\_flag[ of drawing 32 stored in the memory of playback equipment ] = "110110100" (step ST42).

[0299]Next, it confirms whether be over number AGLmax of angles =7 which the angle number AGLN set up at the time (as an angle number which should be reproduced from now on) acquired. If this AGLN is over AGLmax=7 (step ST44 yes), the angle number AGLN will be reset to the predetermined value below AGLmax, for example, "1", (step ST46). If AGLN at this time is less than AGLmax=7 (step ST44 no), the reset processing of step ST46 will be skipped.

[0300]Next, the CPU section of playback equipment reads cell category C\_CAT of drawing 27 from DVD disk 10, and checks the contents of the seamless angle change flag (bit 24) which the provider of DVD disk 10 is writing in (step ST48).

[0301]If this seamless angle change flag is a bit "1" (step ST50 yes), that angle iron will call it the seamless angle iron which makes a unit ILVU as shown in drawing 21. In this case, the DSI data 115 is read in the head navigation pack 86 (drawing 16) of VOB of the beginning of ILVU of the angle number which it is going to reproduce from now on (step ST52).

[0302]This DSI data contains seamless angle information SML\_AGLI as shown in drawing 19. If the angle number which it is going to reproduce from now on is #1, the CPU section of playback equipment, With reference to SML\_AGL\_C1\_DSTA in this seamless angle information SML\_AGLI, the size of ILVU of the jump place address from there to angle number #1 (AGLN=1) and its angle number is acquired (step ST54).

[0303]In this way, based on the size of ILVU of the jump place address of acquired angle number #1 (AGLN=1), and its angle number, the CPU section of playback equipment controls the reading operation of a disk drive part, reads the ILVU to the last, and performs reproduction (step ST56).

[0304]If reading of this ILVU is completed (step ST58), the jump place address of the next ILVU of angle number #1 at that time (AGLN=1) will be searched (step ST58). This search responds to ILVU of AGL2-2 being searched after the end of reading of ILVU of AGL2-1, if it says, for example in the example of drawing 29.

[0305]After the above-mentioned search, when not going into auto angle switching mode, that DSI data 115 is read in the head navigation pack 86 of VOB of the beginning of the next ILVU by (Step ST59 No) and this search (step ST52). Hereafter, the same operation (ST50 yes -ST58) is repeated.

[0306]If the seamless angle change flag mentioned above with reference to drawing 27 is a bit "0" (step ST50 no), the angle iron will call it the non seamless angle block which makes a unit VOB as shown in drawing 15. In this case, fixed time reading appearance of the VOB of the angle number which it is going to reproduce from now on is carried out, and that reproduction is performed (step ST61). Since the regeneration time of one VOB is usually about 0.5 second when this fixed time is made into several seconds, in step ST61, reading and reproduction are performed to two or more continuous VOB(s). The PCI data 113 is read in the head navigation pack 86 (drawing 9) of VOB under reproduction at this time (step ST62).

[0307]This PCI data contains non seamless angle information NSML\_AGLI as shown in

drawing 13. If the angle number which it is going to reproduce from now on is #2, the CPU section of playback equipment, With reference to NSML\_AGL\_C2\_DSTA in this non seamless angle information NSML\_AGLI, the jump place address from there to angle number #2 (AGLN=2) is acquired (step ST64).

[0308]In this way, based on the jump place address of acquired angle number #2 (AGLN=2), The CPU section of playback equipment controls the reading operation of a disk drive part (for example, 30 of drawing 63), The still of the screen of VOB currently reproduced at the time (for example, angle number #1) is carried out, and the next VOB (for example, angle number #2) is searched (step ST68).

[0309]When not going into auto angle switching mode, fixed time reproduction of the next VOB (VOB of the same angle as it or before) is carried out by (Step ST59 No) and this search (step ST61). Hereafter, the same operation (ST50 no, ST61-ST68) is repeated.

[0310]When going into auto angle switching mode, a random number is generated between 1 and AGLmax (=7) by the random number generation/counting part inside (Step ST59 Yes) and CPU of playback equipment (504 of drawing 63). The angle number #1 (AGLN=1) till then is replaced by the angle number (although it may be 1, the probability which becomes angle numbers other than one is high) of the random number which this random number generation/counting part generate (step ST60), and it returns to step ST48. Henceforth, the same processing (seamless reproduction of ST52-ST58 or non seamless reproduction of ST61-ST68) as the above is repeated to the angle cell of a new angle number.

[0311]The user of playback equipment can determine freely whether go into auto angle switching mode (step ST59). For example, the setup key 5y of the remote controller 5 is pressed, and the OSD display of the setup menu is carried out to the monitor section of playback equipment. If the on-off set part of the auto angle change is provided in this OSD display and a user chooses "auto angle change = one" using the cursor key 5q and the enter key 5s of the remote controller 5, It will go into auto angle switching mode (step ST59 yes).

[0312]The reproduction angle permission / inhibit flag set AGL\_flag set up by processing of drawing 33 can be used as follows in processing of step ST60.

[0313]That is, the random number below an AGLmax value is generated by the random number generation/counting part inside CPU of playback equipment (504 of drawing 63). And only "generating random number" minus "1" takes the logical product (logical AND) of the value and AGL\_flag which carried out the bit shift of value "1" to the left by system CPU. And when a logical product is set to 0, the angle number of this generated random number value is dealt with as an angle by which the reproducing permission was carried out.

[0314]This random number can give the maximum (max value) generated, for example in a random (max value which generates n;n) function etc., and can be generated. The judgment of whether to be refreshable is performed based on the return value from this random (n) function, and the bit value of reproduction angle permission / inhibit flag AGL\_flag.

[0315]If it explains more concretely, since it is AGLmax=7, a random (7) function will be used in the example of drawing 31. The return value from this function turns into one value of "1" - "7." Now, this return value is "4" and it is assumed that AGL\_flag is "110, 110, and 100."

[0316]When said value "1" is expressed with the same number of bits as AGL\_flag, it is "000-000-001." It will be set to "000-001-000" if only "4"- "1" = "3" carries out the bit shift of this "000-000-001" to the left. That result will be set to "000-000-000" if a logical product (AND) with this bit value "bit value of 000-001-000" and said AGL\_flag "110, 110, and 100" is taken. That is, the AND-operation result of the correspondence bit (bit of the angle 4 of drawing 32) of

reproduction angle permission / inhibit flag AGL\_flag serves as a reproducing permission by "0", and the angle of angle number = "4" will be reproduced.

[0317]On the other hand, if said reproduction angle permission / inhibit flag AGL\_flag are "110, 111, and 100" when the return value of a random (7) function is "4" (if the reproduction inhibit bit 1 stands on the jam angle 4), A logical product (AND) with AGL\_flag "110, 111 and 100", and left 3 bit-shift value "000-001-000" calculates. This result of an operation is set to "000-001-000." That is, the correspondence bit of reproduction angle permission / inhibit flag AGL\_flag serves as reproduction inhibit by "1", and the angle of angle number = "4" is not reproduced. In this case, a random number generation and an AND operation are repeated until it obtains another random number (return value) from a random (7) function and the correspondence bit of a reproduction object angle number is set to "0" among the results of an operation of the above-mentioned logical product (AND) (until a jam reproducing permission state is acquired).

[0318]Drawing 35 is a flow chart explaining the 2nd example (auto angle by an angle number count) of an angle automatic change.

[0319]Drawing 35 replaces the random number generation processing in step ST60 of drawing 34 by count processing step ST60A of an angle number.

[0320]Although which angle is reproduced automatically next or prediction does not stick at angle automatic switching mode (step ST59 yes) in random number generation processing of drawing 34, in count processing of drawing 35. It can predict which angle is reproduced automatically next in angle automatic switching mode (step ST59 yes).

[0321]The processing which used reproduction angle permission / inhibit flag set AGL\_flag also here is possible. For example, in count processing step ST60A of an angle number, The count which skipped the angle number (correspondence angle of the portion where bit "1" stands in the example of drawing 32) by which reproduction inhibit was carried out is performed, and it can constitute so that only the angle number (correspondence angle of the portion which is bit "0" in the example of drawing 32) in a reproducing permission state may be reproduced.

[0322]Drawing 36 is a flow chart explaining the 3rd example (auto angle by the random number generation which made the angle change cycle variable) of an angle automatic change.

[0323]Drawing 36 is modified so that the length of angle reproduction of the seamless angle regeneration in Steps ST52-ST58 of drawing 34 and the non seamless angle regeneration in Steps ST61-ST68 may change. A reproduction angle not only changes automatically, but in the case of drawing 36, the regeneration period changes during seamless auto angle reproduction. Non, a reproduction angle not only changes automatically, but the regeneration period changes also in seamless auto angle reproduction, Hitoshi.

[0324]Drawing 37 is a flow chart explaining the contents of the seamless angle changing process (ST70) in the angle automatic change of drawing 36.

[0325]It is processing of drawing 36, and if seamless angle change flag =1 is detected (step ST50 yes), seamless regeneration period variable auto angle processing of drawing 37 will be entered.

[0326]First, the random number for regeneration period determination other than the random number of step ST60 is generated from the random number generation/counting part inside CPU of playback equipment (504 of drawing 63). This random number for regeneration period determination is a numerical value which decides how many to reproduce by that angle among ILVU(s) (suppose that there are n pieces) which constitute the angle which it is going to reproduce from now on. For example, if it says in the case of drawing 21, ILVU which constitutes an angle will be six pieces (n= 6), and a random number generation/counting part will generate the arbitrary random numbers for regeneration period determination between 1-6. Here,

explanation is continued, assuming that the generated random number is [3].

[0327]If random number for regeneration period determination = [3] is generated from a random number generation/counting part, ILVU to be reproduced from now on will be set to "three" (step ST701).

[0328]The DSI data 115 is read in the navigation pack 86 (drawing 16) of the head VOB of the first ILVU (for example, ILVU#2 of drawing 21) among three reproduction ILVU of a reproduction object angle (for example, AGL\_C#i of drawing 21) (step ST702).

[0329]This DSI data contains seamless angle information SML\_AGLI as shown in drawing 19. If the angle number which it is going to reproduce from now on is #1 (AGL\_C#i=AGL\_C#1), the CPU section of playback equipment, With reference to SML\_AGL\_C1\_DSTA in this seamless angle information SML\_AGLI, the size of ILVU of the jump place address from there to angle number #1 (AGLN=1) and its angle number is acquired (step ST703). And ILVU#1 of angle number #n reproduced now is read to the last, and reproduction is performed (step ST704).

[0330]If reading of this ILVU#1 is completed, the jump place address of ILVU of angle number #1 (AGLN=1) to change will be searched (step ST705). This search responds to ILVU#2 being searched after the end of reading of ILVU#1, if it says in the example of drawing 21.

[0331]In this way, after the search of the next ILVU (#3) is performed after [ of the three ILVU(s) (#2-#4) ] one end of reproduction (#2), one decrement of random number for regeneration period determination = [number of ILVU(s)] set as [2] is carried out (step ST706), and it is set to [1].

[0332]In this way, since [number =1 of ILVU] by which the decrement was carried out is not smaller than zero (step ST707 no), it returns to step ST702 and read-out and reproduction of the next ILVU (#3) are performed (step ST704).

[0333]Processing of the above steps ST702-ST705 is repeated until [the number of ILVU(s)] becomes smaller than zero.

[0334]If read-out and reproduction of ILVU (#2-#4) of angle number #1 (AGLN=1) are repeated 3 times, [the number of ILVU(s)] will become smaller than zero (step ST707 yes). Then, processing carries out a return to step ST59 of drawing 36.

[0335]Since the number of the reproduction ILVU for which it opts by step ST701 of drawing 37 (initial value of the [number of ILVU(s)] of step ST706) changes with the random numbers generated from the random number generation/counting part inside CPU of playback equipment (504 of drawing 63) to unspecified, Whenever it passes along the loop of step ST48 of drawing 36, ST50, ST70, ST59, and ST60, the length (the number of =ILVU(s)) of angle reproduction will change.

[0336]In this way, it is determined by the random number processing of step ST60 which angle the angle from which reproduction length (regeneration period) changes turns into.

[0337]That is, according to processing of drawing 36 and drawing 37, a reproduction angle number will change with step ST60 at random, and the length of seamless angle reproduction will also change with step ST70 each time.

[0338]Drawing 38 is a flow chart explaining the contents of the non seamless angle changing process (ST80) in the angle automatic change of drawing 36.

[0339]First, the random number for regeneration period determination other than the random number of step ST60 is generated from the random number generation/counting part inside CPU of playback equipment (504 of drawing 63). This random number for regeneration period determination is a numerical value which decides how many to reproduce by that angle among VOB(s) (suppose that there are m pieces) which constitute the angle which it is going to

reproduce from now on. For example, if it says in the case of drawing 15, VOBUs which constitute an angle will be six pieces ( $m=6$ ), and a random number generation/counting part will generate the arbitrary random numbers for regeneration period determination between 1-6. Here, explanation is continued, assuming that the generated random number is [2].

[0340] If random number for regeneration period determination = [2] is generated from a random number generation/counting part, VOBUs to be reproduced from now on will be set to "two" (step ST801).

[0341] The inside of two reproduction VOBUs of a reproduction object angle (for example, AGL\_C#i of drawing 15), From the navigation pack 86 (drawing 9) of the first VOBUs (for example, VOBUs#2 of drawing 15), the PCI data 113 is read and reproduction of the VOBUs#2 is performed (step ST802).

[0342] After reproduction of this VOBUs#2 is completed, one decrement of random number for regeneration period determination = [number of VOBUs(s)] set as [2] is carried out (step ST803), and it is set to [1].

[0343] In this way, since [number =1 of VOBUs] by which the decrement was carried out is not zero (step ST804 no), it returns to step ST802 and <TXFFR=0001 LY="0300" LX="0200" WI="080" HE="250" control pack (PCI) incorporation of the next VOBUs (#3) and reproduction of the VOBUs are performed.

[0344] Processing of step ST802 of a more than is repeated until [the number of VOBUs(s)] becomes zero.

[0345] If read-out and reproduction of VOBUs (#2-#3) of angle number #i (AGLN=i) are repeated twice, [the number of VOBUs(s)] will become zero (step ST804 yes). Then, PCI data is read from the navigation pack of VOBUs (VOBUs#3) when [the number of VOBUs(s)] becomes zero (step ST805).

[0346] This PCI data contains non seamless angle information NSML\_AGLI as shown in drawing 13. If the angle number which it is going to reproduce from now on is #1 (AGL\_C#i=AGL\_C#1), the CPU section of playback equipment, With reference to NSML\_AGL\_C1\_DSTA in this non seamless angle information NSML\_AGLI, the jump place address from there to angle number #1 (AGLN=1) is acquired (step ST806).

[0347] After it, after the CPU section of playback equipment uses as a still the screen of VOBUs (#3) which was being reproduced immediately before, Based on the jump place address of acquired angle number #1 (AGLN=1), VOBUs#4 of angle number #1 is searched (step ST807), and processing carries out a return to step ST59 of drawing 36.

[0348] Since the number of the reproduction VOBUs for which it opts by step ST801 of drawing 38 (initial value of the [number of VOBUs(s)] of step ST803) changes with the random numbers generated from the random number generation/counting part inside CPU of playback equipment (504 of drawing 63) to unspecified, Whenever it passes along the loop of step ST48 of drawing 36, ST50, ST80, ST59, and ST60, the length (the number of =VOBUs(s)) of angle reproduction will change.

[0349] In this way, it is determined by the random number processing of step ST60 which angle the angle from which reproduction length (regeneration period) changes turns into.

[0350] That is, according to processing of drawing 36 and drawing 38, a reproduction angle number will change with step ST60 at random, and the length of non seamless angle reproduction will also change with step ST80 each time.

[0351] Drawing 39 has illustrated change of a reproduction screen when a reproduction angle is changed in the angle automatic switching mode of either drawing 34 - drawing 36.

[0352]If a reproduction angle is changed automatically (separating from a user's consciousness), it will not be clear anymore to a user where to which angle it changed. Especially when an angle change is performed at random, it is still more so.

[0353]Then, as shown in drawing 39, at the time of an angle automatic change (auto angle one), the character or sign which shows the angle number under present reproduction from the OSD section of playback equipment is generated, and it superimposes in an angle picture while reproducing it. If it does in this way, the user can know what the angle under present reproduction is by the angle number (according to a reproduction angle, it changes like AUTO-ANGLE#4 and AUTO-ANGLE#7) under superimposed auto angle reproduction.

[0354]The necessity of making it always displaying on a reproduction screen does not necessarily have an angle number (AUTO-ANGLE#4, AUTO-ANGLE#7 grade) under auto angle reproduction. After angle change is made automatically, only fixed time (for [ several seconds ] grade) displays an angle number, and it may be made for after this fixed time lapse to eliminate an angle number (AUTO-ANGLE#4, AUTO-ANGLE#7 grade) by the user set using a setup menu. Or it is good for an angle number (AUTO-ANGLE#4, AUTO-ANGLE#7 grade) not to be displayed at all, and also make even if angle change is automatically made by the user set using a setup menu.

[0355]Drawing 40 is a block diagram explaining the important section composition of the multi-angle automatic change reproducing system produced by changing some of one devices of drawing 45 mentioned later - drawing 47, and drawing 63.

[0356]Usually, the corresponding sound has followed on the multi-angle image. In that case, it becomes possible to perform the automatic change of a reproduction angle based on the contents change of this sound.

[0357]That is, the voice data (audio pack) recorded on DVD disk 10 is transmitted to the audio decoder section 60 from the system processor part 54. The audio decoder section 60 transmits the digital data of the audio pack relevant to the angle under reproduction to digital analog converter DAC644A under control of system CPU section 50 of playback equipment. This DAC644A carries out D/A conversion of the bit stream of the received audio information to a corresponding analog signal. The changed analog audio signal is amplified suitably in the output circuit 644B, and is outputted to the external loudspeaker parts 8L/8R.

[0358]The analog voice signal (or digital sound data) processed by DAC644A is inputted into the sound level primary detecting element 646. The sound level primary detecting element 646 detects the signal level (or data value of digital sound data) of the inputted analog voice signal. The detected signal level (data value) is compared with a predetermined judging level (determination data) in the sound level judgment part 648. If the detected signal level (data value) is over the predetermined judging level (determination data), the sound level judgment part 648 will judge with it being angle switching timing, and will notify that to the system CPU section of playback equipment.

[0359]Drawing 41 is a flow chart explaining the 4th example (auto angle by sound level detection) of an angle automatic change.

[0360]Processing of drawing 41 is what added the sound level detection process (step ST69) to random number generation auto angle processing of drawing 34, and is carried out by the hardware of drawing 40. Since processing of step STs 40-68 of drawing 41 is the same as that of the case of drawing 34, the explanation is omitted.

[0361]The composition of drawing 40 can perform the following operations according to the procedure of drawing 41.

[0362]The live concert of the rock bands in DVD disk 10 is recorded now, and the case where photography inclusion of the scene with the various concert is carried out with two or more cameras is assumed. For example, with five cameras, only the "whole" band, a "vocalist", a "guitarist", a "bassist", and a "drummer" assume that multi-angle inclusion is carried out, respectively. And the audio pack of the performance sound of the whole band is linked to the angle of the "whole" band, The audio pack as which vocal was emphasized is linked to the angle of only a "vocalist", The audio pack as which the lead guitar was emphasized is linked to the angle of only a "guitarist", The audio pack as which the bass guitar was emphasized is linked to the angle of only a "bassist", and it is assumed that the audio pack as which drum percussion was emphasized is linked to the angle of only a "drummer."

[0363]At first, the introduction part of the music which is an angle of the whole band is reproduced, and suppose that the intro was completed and the performance sound became large suddenly. The level variation of this performance sound is detected by the sound level primary detecting element 646+ sound level judgment part 648 (step ST69 yes of drawing 41), and the CPU section of playback equipment is notified that the timing of the angle automatic change came.

[0364]Then, if it is in auto angle mode (step ST59 yes), the CPU section of playback equipment, It controls so that a disk drive part reads ILVU (or VOBV) of the cell of another angle based on the angle number by which the automatic generation was carried out by step ST60 (step ST60).

[0365]As a result, if auto select of the vocalist was made, for example, the vocal emphasis sound linked to this image with the vocalist's angle image comes to be reproduced. If auto select of the drummer was made, the emphasis sound of the drum percussion linked to this image with the drummer's angle image comes to be reproduced.

[0366]The angle number automatic determination processing (ST60) by the random number generation of drawing 41 may be transposed to angle number count processing (ST60A; increment processing or decrement processing of an angle number) as shown in drawing 35 or drawing 44.

[0367]In the composition of drawing 40, when using an analog voice signal for the sound level detection for an angle automatic change, the following processings can be performed, for example.

[0368]That is, the inside compass signal of 200 Hz - about 2 kHz is taken out via a band pass filter if needed among input signal levels (in order to prevent the angle automatic change by a sound level malfunctioning in the noise component which is not meant). The taken-out mid-range audio signal is detected and the audio signal amplitude (or envelope level of the signal) is detected (sound level primary detecting element 646).

[0369]The detected signal amplitude (envelope level) is sampled for every (a color television signal [ of standard NTSC / 1 / 30 seconds (every) ]) frame period of a video signal, and a sampled value (direct current level) is once latched. The latched sampled value is compared with a predetermined reference value by the analog comparator. When a sampled value exceeds a reference value, a voice detection signal (binary signal which changed from a low level high-level) is outputted from a comparator (sound level judgment part 648).

[0370]This voice detection signal answers the signal edge which changes high-level, and the CPU section of playback equipment performs an angle automatic change (processing of step ST69 yes [ of drawing 41 ], ST59 yes, and ST60). When it is in a low level state when the voice detection signal outputted from a comparator (sound level judgment part 648) changes from high level to a low level or, an angle automatic change is not performed (step ST69 no of drawing 41).

[0371]A band pass filter (200 Hz - the above-mentioned about 2 kHz) always is not required. In the case of the good sound source of S/N, it is also common for this band pass filter to be unnecessary. On the other hand, when performing the angle automatic change reacted to a voice while there is noise, such as a running sound of a car, the band pass filter (or highpass or a low pass filter) which narrowed pass band width according to the noise environment can detect the target voice.

[0372]In the composition of drawing 40, when using a digital sound signal (16-24-bit linear PCM) for sound level detection, the following processings can be performed, for example (the case where the above-mentioned filter is not used here is assumed). That is, 8 bits of higher ranks are set in eight bit registers among the 16-24-bit digital sound data before D/A conversion (from the maximum loudness level of sound (it is 0 dB in a full bit), since 8-16 bits of low ranks are data of the small loudness-level-of-sound information not more than -48dB, they are disregarded here).

[0373]If the voice data set in eight bit registers is "00000000", a sound level is a very small loudness level of sound not more than -48dB, and an angle automatic change is not performed (step ST69 no of drawing 41).

[0374]If the voice data set in eight bit registers says in the bit row of LSB-MSB and is "11110000", a sound level is a small loudness level of sound of -24dB, but. Since the voice which sings a ballade etc. corresponds to a level of this level, it performs an angle automatic change (processing of step ST69 yes [ of drawing 41 ], ST59 yes, and ST60).

[0375]When the vocalist's angle number is known a priori in the angle iron of a reproduction object, Processing which searches a vocalist's angle number when voice data = "11110000" is detected (after setting up a vocalist's angle number by step ST60 of drawing 41) The CPU section of playback equipment may be programmed so that ST58 or ST68 may be performed. It cannot be guaranteed [ that it will certainly change to a vocal angle if vocal reproduction is started since distinction of whether to be what was obtained / whether voice data = "11110000" is what was obtained from vocal, and / from the accompaniment sound at that time is not attached ]. However, the angle automatic change which answered sound level change functions.

[0376]If the voice data set in eight bit registers says in the bit row of LSB-MSB and is "11111100", a sound level turns into an inside loudness level of sound of -12dB. Since many music performance sounds correspond to a level of this level, they perform an angle automatic change (processing of step ST69 yes [ of drawing 41 ], ST59 yes, and ST60). In this case, since the sound-source kind of voice data = "11111100" cannot be specified in many cases, an angle change is good to perform at random (step ST60 of drawing 41).

[0377]In n division, display area of drawing 42 is a figure explaining the case where display n refreshable angle images on the screen (here, it quadrisections) carried out, and the angle image chosen before long now is displayed by an animation.

[0378]When the number of the angles in the angle iron recorded on the disk is four, monitor display can be quadrisectioned and displayed like drawing 42. It is developed by the frame memory section (642 of drawing 45 - drawing 47, and drawing 63) of playback equipment, and this quadrisection screen is sent to a monitor section.

[0379]When doing n division of a display screen and displaying n angle images simultaneously, the start address and size in each n angle are set up first. Four angle cells are recorded on seamless angle iron, and if the case where it displays on the monitor display which had them quadrisectioned is taken for an example, as shown in the drawing 42 upper row, angle #1 will be reproduced by the upper left portion of a monitor section as an animation image. At this time,

angle #2 - #4 are Still Picture Sub-Division. (Since it can have a maximum of nine angle cells within one angle iron in the present DVD video specification) The number of partitions  $n$  is set to a maximum of 9. After reading reproduction of angle #1 is completed by a predetermined ILVU number, an optical pickup (not shown) carries out a trace jump at new ILVU of an angle switch destination, and like the drawing 42 lower berth, the following angle #2 becomes an animation image and it is reproduced. At this time, angle #1, #3, and #4 become Still Picture Sub-Division.

[0380]Thus, after it performs angle automatic change reproduction one by one and reproduction finishes to the angle maximum (here  $AGL_{max}=4$ ), a reproduction angle returns to angle #1. Henceforth, angle #1 - #4 are reproduced cyclically (when using angle increment processing ST60A of drawing 43 mentioned later).

[0381]Or angle #1 - #4 can also be reproduced cyclically, changing a reproduction angle at random (when using random number angle processing ST60 of drawing 34 mentioned above).

[0382]The video decoder part of playback equipment has 2-4 MPEG decoders, When 2-4 video streams (2-4 angle cell datas) by which MPEG encoding was carried out can be decoded independently simultaneously, arbitrary screens (one to 4 screen) can also be made into an animation image among the quadrisection screens of drawing 42.

[0383]For example, playback equipment is a DVD player corresponding to the both sides of the high resolution video (digital Hi-vision) of 1000 horizontal resolution with the usual video (digital NTSC) of 500 horizontal resolution, and 1050 scanning lines in 525 scanning lines, Suppose that Hi-Vision DVD disk playback is performed by the parallel processing of four MPEG2 decoders. In such a DVD player, since four MPEG decoders can be used when playing the multi-angle DVD disk of NTSC, it becomes possible to make all the images of the quadrisection screen of drawing 42 into an animation image.

[0384]It is a case where parallel decoding of two or more video streams can be simultaneously carried out using two or more MPEG decoders (here four) as mentioned above, When the buffer memory of sufficient size can be used, the image of the quadrisection screen of drawing 42 can also be considered as the image of two or more program chains (PGC#1 - PGC#k) of drawing 5 instead of the image of drawing 15 or the angle cell ( $AGL\_C\#i$ ) of drawing 21.

[0385]Although drawing 42 has illustrated the case where tiling arrangement of the four screens is carried out, four screens can also be displayed using an overlapping window. For example, as long as it says in the case of the upper row of drawing 42, angle #1 by which moving image reproduction is carried out is displayed on a full-screen, and it may be made to make the small window which popped up on the display screen of angle #1 come out of and draw angle #2 of a still drawing reproduction state - #4. In this case, if the angle by which moving image reproduction is carried out is changed to #2 as shown in the lower berth of drawing 42, the animation image of angle #2 will be displayed on a full-screen and the still drawing of angle #1, #3, and #4 will come to be displayed in three small windows.

[0386]Drawing 43 is a flow chart explaining the 5th example (auto angle of  $n$  split display) of an angle automatic change.

[0387]If the reproduction key 5c of the remote controller 5 is pressed after a reproduction object angle number is determined by processing of drawing 33, playback of DVD disk 10 will be started. And when a reproduction part goes into the angle iron of drawing 15 or drawing 21, the CPU section of playback equipment, The present angle number  $AGLN$  (the example of the drawing 42 upper row #1) reproduced the number  $AGL_{max}$  of angles in the angle iron (the example of drawing 42 four pieces) and from now on is acquired (step ST40A).

[0388]In this way, based on the gained number AGLmax of angles (=4), the writing position and the write-in size of each angle to the frame memory of playback equipment are determined (step ST43).

[0389]For example, one frame of the bitmapped image developed by the frame memory has the resolution of 640X480 dots, and the case where each dot is expressed by 8-bit gradation is considered. In this case, one frame will be divided into four small screens of 320X240 dots if the equal segmentation display for several acquisition angle minutes is performed. And the 1st small screen (level the position of 1-320 dots; vertical position of 1-240 dots) is assigned to angle #1, The 2nd small screen (level the position of 321-640 dots; vertical position of 1-240 dots) is assigned to angle #2, The 3rd small screen (level the position of 1-320 dots; vertical position of 241-480 dots) is assigned to angle #3, and the 4th small screen (level the position of 321-640 dots; vertical position of 241-480 dots) is assigned to angle #4.

[0390]Or if one angle whose animation is displayed is displayed on a full-screen and the still display of the other angle is carried out to a small window, assignment of one frame may be performed as follows.

[0391]Namely, a full screen (640X480 dots) is assigned to animation display angle  $AGLN=x$ , The 1st window frame (level the position of 40-160 dots; vertical position of 50-140 dots) is assigned to still display angle  $AGLN=yof \text{ ** } 1st \ 1$ , The 2nd window frame (level the position of 40-160 dots; vertical position of 190-280 dots) is assigned to still display angle  $AGLN=yof \text{ ** } 2nd \ 2$ , The 3rd window frame (level the position of 40-160 dots; vertical position of 330-420 dots) is assigned to still display angle  $AGLN=yof \text{ ** } 3rd \ 3$ . In this case, the view as popup of the 1st window frame ( $AGLy1$ ) of 90x120 dots is carried out to the upper left of a full-screen frame ( $AGLx$ ), The view as popup of the 2nd window frame ( $AGLy2$ ) of 90x120 dots is carried out in the center of the left of a full-screen frame, and the view as popup of the 3rd window frame ( $AGLy3$ ) of 90x120 dots is carried out to the lower left of a full-screen frame.

[0392]The animation of the present angle number AGLN (the example of the drawing 42 upper row  $AGLx=\#1$ ) chosen in the display of the full-screen +3 above-mentioned Popup Window as what will be reproduced from now on is displayed on a full-screen, The still drawing of the 1st non selection angle number (the example of the drawing 42 upper row  $AGLy1=\#2$ ) is displayed on the 1st window frame, The still drawing of the 2nd non selection angle number (the example of the drawing 42 upper row  $AGLy2=\#3$ ) is displayed on the 2nd window frame, and the still drawing of the 3rd non selection angle number (the example of the drawing 42 upper row  $AGLy3=\#4$ ) is displayed on the 3rd window frame.

[0393]After determining the writing position and the write-in size to a frame memory [ as opposed to each angle as mentioned above ], it confirms whether be over number AGLmaxof angles =4 which the angle number AGLN set up at the time (as an angle number which should be reproduced from now on) acquired. If this AGLN is over  $AGLmax=4$  (step ST44 yes), the angle number AGLN will be reset to the predetermined value below AGLmax, for example, "1", (step ST46). If AGLN at this time is less than  $AGLmax=4$  (step ST44 no), the reset processing of step ST46 will be skipped.

[0394]After changing into the state where number AGLmaxof angles =4 which the angle number AGLN which should be reproduced as mentioned above after this acquired is not exceeded, The writing position and the write-in size to a frame memory of the angle number AGLN (here angle #1) which should be reproduced from now on are specified (step ST47).

[0395]In an equivalent quadrisection display, in step ST47, the 1st small screen (level position [ of 1-320 dots ]; position of 1-240 dots) is assigned to angle #1 like drawing 42.

[0396]The processing same to Steps ST48-ST58 and Steps ST61-ST68 as drawing 34 is performed after it.

[0397]Although check step ST59 of whether to go into angle automatic switching mode is after the jump place address search of step ST58 or ST68 in drawing 34, This check step is skipped in drawing 43 (that is, if processing of ST58 or ST68 ends, the angle number by which moving image reproduction is carried out in step ST60A will certainly be changed.).

[0398]Angle number decrement processing may be sufficient as angle number increment processing step ST60 of drawing 43, and it may be replaced by random number generation processing step ST60 like drawing 34.

[0399]In the case of multi-angle in which the same scene was substantially mentioned with different camera angle, the above explanation was explained, but the automatic change reproducing system of this invention is applicable similarly to the multi scene in which the scene with different various scenes was mentioned. For example, upper left screen #1 of drawing 42 is made into the scene which a salaried worker runs, upper right screen #2 is made into the run scene of a sports car like drawing 39, lower left screen #3 is made into the home run scene of baseball, and it is good also as a scene of the game of boxing by lower right screen #4.

[0400]Drawing 44 is a flow chart explaining the 6th example (auto angle by the angle number count which made the angle change cycle variable) of an angle automatic change.

[0401]Drawing 44 is a flow chart explaining the 6th example (auto angle by the angle number count which made the angle change cycle variable) of the angle automatic change concerning other embodiments of this invention. This flow chart is what replaced random number generation processing step ST60 of drawing 36 by angle number increment / decrement processing step ST60A, and other processing step STs are common.

[0402]By the way, in the personal computer (drawing 64 is referred to and it is the after-mentioned) which can reproduce DVD video now with a DVD-ROM drive, it is possible to carry out the auto angle of this invention by software. In that case, the auto angle software installed in a personal computer becomes what programmed the processing corresponding to processing of drawing 33 - drawing 44.

[0403]Thus, when programming an auto angle with a personal computer, angle number increment processing step ST60A of drawing 35 is made to a little more advanced thing, for example.

[0404]For example, in the angle reproduction set up like drawing 31, if an angle number is made to \*\*\*\*\* simply, an angle number will change automatically like angle number #1, #2, #4, #7, #1, and #2 --. \*\* and this can also be developed into auto angle reproduction of turn like #1, #7, #4, #2, #4, #7, #1, and #7 -- for which a user wishes by programming of a personal computer.

[0405]The above auto angle programs are individually installable in a personal computer with a DVD drive via a floppy disk, CD-ROM, DVD-ROM, or communication media.

[0406]The auto angle explained with reference to drawing 34 - drawing 44 is not limited when only specific 1 angle image is displayed on TV monitor. When two or more angle images are on TV monitor and a simultaneous display is carried out so that it may illustrate to drawing 42, an auto angle (angle automatic change) is able to be made to perform independently for every angle screen.

[0407]Drawing 45 is a block diagram explaining the entire configuration of the 1st playback equipment in which the digest display system of the multi-angle scene was incorporated.

[0408]The remote controller receive section 4A which receives the operation states of the remote

controller 5 and the remote controller 5 with which this playback equipment receives user's operation, It has the panel display 4B which notifies a user of the key input section 4 which receives user's operation by the main part side of playback equipment and the operation result by a user, the recovery status of DVD disk (optical disc) 10, etc., and was provided in the main part of playback equipment (and/or, remote controller). As the other external device, the monitor section 6 and the loudspeaker parts 8L/8R are prepared.

[0409]The key input section 4, the panel display 4B, the remote controller 5, and the monitor section 6 constitute the user interface on vision. The monitor section 6 is not only used as a reproduced image monitor of a DVD disk, but is used as a displaying means of onscreen display OSD. This monitor section 6 is not what is limited to the CRT display of a direct viewing type, a liquid crystal display, and a plasma display, It may be the CRT type projector, liquid crystal type projector, or micro mirror type projector which projects the image which includes OSD information in a large screen other than a direct viewing type display.

[0410]As a portion which constitutes the user interface on an acoustic sense, it has the loudspeaker parts 8L/8R. Although the loudspeaker parts 8L/8R of a two-channel stereo pair are shown as an easy example here, in order to correspond to the digital surround (AC-3, DTS, SDDS, etc.) of many channels more, 5 or more sets of loudspeakers may be prepared.

[0411]The user's operation information from the remote controller 5 is notified to system CPU section 50 which controls operation of the whole playback equipment via the remote controller receive section 4A. The user's operation information from the key input section 4 is directly notified to CPU section 50. The operation situation (reproduction information of various established states or a DVD disk) of the playback equipment corresponding to user's operation information is suitably displayed on the panel display 4B by this CPU section 50.

[0412]System CPU section 50 of playback equipment is provided with the angle automatic switching part 500 built by a predetermined processing program. The regeneration period deciding part 502 as which this angle automatic switching part 500 determines the cycle of change reproduction of a multi-angle image, The simultaneous display control section 504A which judges the angle number whose animation is displayed the simultaneous display of an angle, and in it, and display timing, [ two or more ] The selection control part 506A which controls the simultaneous display to the change display-for angle number specified by user, simultaneous reproduction [ of a sub video image and a sound ], and screen top of an angle number, etc. is included. This composition can perform [ system CPU section 50 ] now display control (digest display control of multi-angle) of angle multiple pictures.

[0413]When performing an angle change per ILVU, it can decide on the continuation moving-image-reproduction time (cycle) of the same angle arbitrarily. The continuation moving-image-reproduction time (cycle) of this angle is manageable by the regeneration period deciding part 502 in system CPU section 50.

[0414]The random number generation/counting part which generates the angle number from which this angle automatic switching part 500 is the target of an automatic change by the random number generation or an angle number count (504 of drawing 63), And the angle number determination part (506 of drawing 63) which determines the angle which is the target of an automatic change about the angle number which the user specified as the reproducing permission state can also be included. This composition can also perform [ system CPU section 50 ] now control (auto angle control) which changes a reproduction angle automatically in the portion on which the multi-angle image was recorded.

[0415]The memory (RAM and ROM) 52 and the memory interface (memory I/F) 53 are

connected to system CPU section 50. The various processing program used for the motion control of playback equipment is stored in ROM of the memory 52, and RAM of the memory 52 is used as a work area. Input/output control of this memory 52 is performed via memory I/F53.

[0416]CPU section 50 uses RAM of the memory 52 as a work area, Based on the various processing program stored in ROM of the memory 52, operation of the disk drive part 30, the system processor part 54, the video decoder part 58, the audio decoder section 60, the sub video decoder part 62, and D/A conversion and a regeneration part 64 is controlled.

[0417]While the disk drive part 30 rotates DVD disk 10 set to the tray (not shown) of the main part of playback equipment, the record data (main video image data/video data including moving image information and still picture information.) from DVD disk 10 The navigation data for performing sub picture data including caption data and line menu information, audio information including speech information, and reproduction control which the provider of the DVD disk meant, etc. are read. In the disk drive part 30, the read data receives signal processing, such as a signal recovery and an error correction, serves as a data row (refer to drawing 7) of a pack style, and is sent to the system processor part 54.

[0418]In the data row from the disk drive part 30, the order of a row of three kinds of packs after a navigation pack is arbitrary. The kind of pack after a navigation pack may also have three or less (nothing, one kind, or two kinds) kinds of cases. A navigation pack and a video pack are needed for the multiangle reproduction in DVD video at worst among these packs.

[0419]The system processor part 54 judges the classification of various packets contained in the data played from DVD disk 10, and builds in the packet transfer treating part (not shown) which transmits the data in the packet to each corresponding decoder (58-62).

[0420]The system processor part 54, the BIDEODE coater part 58, the audio decoder section 60, and the sub video decoder part 62, The register (not shown) which carries out the temporary storage of the instructions, the information, etc. from the system time clock (STC) and system CPU section 50 for getting to know operation timing, respectively is included.

[0421]Said packet transfer treating part in the system processor part 54 carves the pack style data row from the disk drive part 30 into four kinds of packs (a navigation pack, a video pack (main video image pack), a sub video image pack, and a video pack). The ID information in which the kind of transfer time data and data is shown is recorded on each pack which was able to be carved.

[0422]The system processor part 54 transmits a video pack, a sub video image pack, and a video pack to the video decoder part 58, the sub video decoder part 62, and the audio decoder section 60 with reference to such transfer time data and ID information, respectively.

[0423]The system processor part 54 transmits the control data in a navigation pack to the memory (RAM) 52 via memory I/F53. Memory I/F53 is an interface circuitry which controls the input and output to this RAM52. This RAM52 stores the transmitted control data temporarily. CPU section 50 controls the reproduction motion of each part of the main part of playback equipment with reference to the control data memorized in RAM52.

[0424]The video decoder part 58 decodes the video data in the video pack transmitted from the system processor part 54 by which MPEG encoding was carried out, and generates the picture image data before compression.

[0425]The sub video decoder part 62 decodes the sub picture data in the sub video image pack transmitted from the system processor part 54 by which run length compression was carried out, and generates the bit map sub picture data before compression.

[0426]The highlight treating part (not shown) which performs highlight processing other than the

sub video decoder which decodes the sub picture data from the system processor part 54 to the sub picture data after decoding is provided in this sub video decoder part 62.

[0427]The above-mentioned sub video decoder elongates the picture element data (an emphasis pixel, a pattern pixel, background pixels, etc. are included) of 2 bitwisely by which run length compression was carried out in accordance with the predetermined rule, and restores the original bitmapped image.

[0428]The above-mentioned highlight treating part performs corresponding highlight processing according to the XY coordinate value which shows the rectangular area where the highlight information (for example, menu selection selections) supplied from system CPU section 50 is displayed, a color code, and a highlight color / contrast value.

[0429]This highlight processing can be used in the vision user interface on the monitor section 6 as a means which enables it to recognize easily the specific item (button which chooses specific items, such as a kind of playback voice language, and a kind of using language of a reproduction title) as which the user was displayed.

[0430]If the color and contrast of sub picture data for every pixel after decoding are changed according to said highlight information, the sub picture data after this change will be supplied to the image synthesis section (not shown) in the video processor part 640. In this image synthesis section, the main video image data (video data) after decoding and the sub picture data (a title, a menu, etc.) after highlight processing are compounded, and that image composing comes to be displayed by the monitor section 6.

[0431]The memory 52 mentioned above contains the menu table which stores start addresses, such as a sub video image menu, an audio menu, an angle menu, and a chapter (program) menu. Although the particular part of these menus is emphasized, said highlight processing is used.

[0432]The audio decoder section 60 decodes the audio information in the audio pack transmitted from the system processor part 54, and generates the voice data of a monophonic recording, a two-channel stereo, or a multi-channel stereo. In the case of the data (MPEG, AC-3, DTS, etc.) in which compression encoding of the audio information in an audio pack was carried out, the decoding is also performed by audio decoder section 60 inside.

[0433]The sub picture data (usually a title or the bit map data of a menu) decoded in the picture image data (usually moving image signal) and the sub video decoder part 62 which were decoded in the video decoder part 58 is transmitted to the video processor part 640. In this video processor part 640, picture image data and sub picture data are mixed at a predetermined rate, and the video data for a display (digital) is generated. The generated video data serves as a final analog video signal (a composite video signal, a separation S signal, component signal Y/Cr/Cb, or Y/R-Y/B-Y) via the video encoder 641, and is outputted to the monitor section 6.

[0434]When the picture image data decoded in the video decoder part 58 is this editing portion of a movie, sub picture data is a title of the language which the user usually chose, and movie book editing containing a title is performed by the monitor section 6.

[0435]When the picture image data decoded in the video decoder part 58 is a menu portion of a movie, sub picture data serves as the character and user choice button (highlight processing is carried out suitably) which usually constitute a menu. In this case, the background (Still Picture Sub-Division or animation) of a menu is displayed on the monitor section 6 with picture image data, and the button from which a display changes with sub picture data corresponding to user choice operation is lapped and displayed on scene painting.

[0436]The video processor part 640 can possess the OSD section (refer to drawing 51) which generates the indicative data of an onscreen display. The user's operation from remote controller

5 grade is processed by system CPU section 50, and the processing result is sent to the OSD section of the video processor part 640 from CPU section 50. The OSD section generates the image data corresponding to the processing result from system CPU section 50, and sends it out to the monitor section 6 in analog video signal form.

[0437]If it has another way of speaking, the video processor part 640 can be called portion which changes into an analog signal the digital signal outputted from the video decoder part 58 and the sub video decoder part 62, and multiplexes it.

[0438]The frame memory section 642 is connected to the video processor part 640. This frame memory section 642 is used for multiplexing of the picture of the above-mentioned picture image data, and the picture of sub picture data, and also it is used for n division (quadrisection and nine division) multi-picture features explained with reference to drawing 42.

[0439]This frame memory section 642 can be used, when sending this still drawing to the monitor section 6 until it fixes a part of image from the video decoder part 58 as still drawing and reproduction of a target chapter starts, when a chapter search etc. are performed.

[0440]This frame memory section 642 can be used, also when OSD performs the display corresponding to a user's operation result and multiplexing to the picture image data of that OSD display is performed.

[0441]The audio information decoded by the audio decoder section 60 is transmitted to DAC and the output circuit 644. The audio information (digital) from the audio decoder section 60 is changed into a corresponding analog voice signal by DAC and the output circuit 644, is suitably amplified, and is sent to the loudspeaker parts 8L/8R.

[0442]Said video processor part 640, the video encoder 641, the frame memory section 642, and DAC and an output circuit 644 constitute D/A conversion and the regeneration part 64.

[0443]Drawing 46 is a block diagram explaining the entire configuration of the 2nd playback equipment in which the digest display (two or more angle simultaneous moving image reproduction) system of the multi-angle scene was incorporated. Drawing 46 shows the example using two or more MPEG decoders.

[0444]The composition of drawing 46 is common in the composition of drawing 45 except for the function (program) of a decoder portion (58-62) and system CPU section 50. Then, the playback equipment of drawing 46 is explained focusing on a different point from drawing 45.

[0445]In drawing 46, the 1st decoder section 58A decodes the data of the video pack transmitted from the system processor part 54, and an audio pack, While transmitting the video signal (main video signal) after MPEG decoding to the video processor part 640, the audio signals (AC3 multi-channel signal or a linear PCM signal) after decoding are transmitted to DAC644.

[0446]The 2nd decoder section 62A decodes the data of the sub video image pack transmitted from the system processor part 54, and an audio pack, While transmitting the sub video signal (a title or a menu) after decoding (run length extension) to the video processor part 640, the audio signal after decoding is transmitted to DAC644.

[0447]The 3rd decoder section 60A decodes the data of the video pack transmitted from the system processor part 54, and an audio pack, While transmitting the video signal (main video signal) after MPEG decoding to the video processor part 640, the audio signal after decoding is transmitted to DAC644.

[0448]DAC644 chooses either of the audio signals transmitted from the 1st - the 3rd decoder section (1 or plurality) by instructions of system CPU section 50, and changes and outputs it to an analog audio signal.

[0449]

[0437N]The video processor part 640 chooses either of the video signals transmitted from the 1st and 3rd decoder sections (or wholly) by instructions of system CPU section 50, superimposes suitably the sub video image from the 2nd decoder section on it, and transmits it to the video encoder 641.

[0450]In performing a multiple-pictures multi-angle digest display like drawing 42, when it has two or more MPEG decoders (two of the 1st and 3rd decoder sections) like drawing 46, the angle screen of plurality (here two) can be considered as animation display. The angle multi picture display control section 508 of system CPU section 50 orders it suitably this multiple-pictures multi-angle animation digest display. In order to perform 2 screen simultaneous animation display smoothly in this multiple-pictures multi-angle animation digest display, it is desirable to use the high-speed drive of 2-3X or more for the disk drive part 30.

[0451]Since the composition of drawing 46 has two or more independent audio decoders, it becomes possible to carry out parallel execution of two or more kinds of audio decodings (linear PCM and AC3 multi-channel, DTS multi-channel, etc.).

[0452]For example, it is assumed that the 1st decoder 58A was provided with AC3 decoder, the 2nd decoder 62A was provided with the DTS decoder, and the 3rd decoder 60A is provided with the decoder of linear PCM. When the audio pack played from DVD disk 10 contains two sorts, AC3 digital audio signal and a linear PCM audio signal, The 5.1-channel multi-voice data of AC3 can be taken out from the 1st decoder section 58A, and two-channel stereo sound data can be taken out from the 3rd decoder section 60A. Such voice data is changed into an analog voice signal by DAC644. And it becomes possible to reproduce a two forward left right sound by linear PCM, and to reproduce a surround channel and a subwoofer channel by AC3.

[0453]When similarly the audio pack played from DVD disk 10 contains two sorts, a DTS digital audio signal and a linear PCM audio signal, The 5.1-channel multi-voice data of DTS can be taken out from the 1st decoder section 58A, and two-channel stereo sound data can also be taken out from the 3rd decoder section 60A. Such voice data is changed into an analog voice signal by DAC644. And it becomes possible to reproduce a two forward left right sound by linear PCM, and to reproduce a surround channel and a subwoofer channel by DTS.

[0454]Drawing 47 is a block diagram explaining the entire configuration of other playback equipment in which the digest display (two or more angle simultaneous moving image reproduction) system of the multi-angle scene was incorporated. Drawing 47 shows the example using a highly efficient decoder.

[0455]The composition of drawing 47 is common in the composition of drawing 45 except for the function (processing performance) of a decoder portion (58). Then, the playback equipment of drawing 47 is explained focusing on a different point from drawing 45.

[0456]In drawing 47, the video decoder part 58B, High-speed decoding of the data (data of a multi-angle portion) of the video pack transmitted at high speed from the system processor part 54 is carried out, and the video signal (main video signal of multi-angle) after MPEG decoding is transmitted to the video processor part 640. If it is made to correspond to the example of drawing 42, in the video decoder part 58B, MPEG decoding of the video stream of the angle of plurality (a maximum of four) will be carried out simultaneously substantially.

[0457]A sub video decoder part and the selected output 62B decode the data of the sub video image pack transmitted from the system processor part 54, The sub video signal (a title or a menu) after decoding (run length extension) is selectively transmitted to the video processor part 640 by instructions of system CPU section 50.

[0458]For example, if it is in the state where the specific angle (for example, angle #1 of drawing

42) was chosen when four multiple-pictures motion-video signals are transmitted to the video processor part 640 from the video decoder part 58B, The sub video images (title etc.) corresponding to this specific angle (angle #1) are chosen. And the selected sub video image is transmitted to the video processor part 640 from a sub video decoder part and the selected output 62B.

[0459]The video processor part 640 superimposes the sub video images (title etc.) from a sub video decoder part and the selected output 62B on the image of said specific angle (angle #1) among 4 screen multi-angle video signals from the video decoder part 58B, and sends them to the video encoder 641.

[0460]An audio decoder section and the selected output 60B, The data of the audio pack transmitted from the system processor part 54 is decoded, Either (animation display angle #1 or #2 surrounded with the thick frame when making it correspond to the example of drawing 42) of the audio signals for decoded two or more angles (if it is made to correspond to the example of drawing 42, it will be a part for four angles) is chosen by the instructions from system CPU section 50. And the digital audio signal of the selected angle is transmitted to DAC644.

[0461]DAC644 changes into an analog audio signal the digital audio signal transmitted from the audio decoder section and the selected output 60B, and outputs it to the exterior of playback equipment.

[0462]When the sound of each angle image #1 by which it was indicated by the multi-angle digest like drawing 42 - #4 is common to all the angles, the selection operation of the above-mentioned audio signal in an audio decoder section and the selected output 60B is unnecessary.

[0463]The MPEG throughput of the video decoder part 58B of drawing 47 is high, and is provided with the performance (for example, performance which carries out MPEG decoding at the speed of 4 times or more of ordinary reproduction) which can execute two or more MPEG decoding simultaneously on parenchyma. In this case, in performing a multiple-pictures multi-angle digest display like drawing 42, all the angle screens of plurality (here a maximum of four) can be considered as animation display. The angle multi picture display control section 508 of system CPU section 50 orders it suitably this multiple-pictures multi-angle animation digest display. In order to perform 4 screen simultaneous animation display smoothly in this multiple-pictures multi-angle animation digest display, it is desirable to use the high-speed drive of 4-5X or more for the disk drive part 30.

[0464]Drawing 48 is a figure explaining the composition of the remote controller which can be used with the personal computer (or the recording playback equipment / DVD VCR which is not illustrated) provided with drawing 45 - drawing 47, drawing 63 - the playback equipment / DVD video playr / DVD regenerative function of drawing 64. Although the operation in which a DVD video playr or a DVD VCR is fundamental also at the operation key provided in the body front panel (not shown) is possible, the remote controller 5 performs various operations in which the feature of DVD was employed efficiently.

[0465]Hereafter, the function (or usage) of each key of the remote controller 5 of drawing 48 is explained.

[0466][The function of the power key (POWER) 5a]

The downstream of the AC-power-supply circuit of <1> device main frame is turned on and off.

[0467]Where a disk is set to the inside of <2> devices, when the power key is pressed, the kind (DVD-RW, DVD-R, or DVD video) of disk is distinguished and displayed. That is displayed when the disk is a playback impossible disk.

[0468]If the power key is pressed when the disk set to the inside of <3> devices contains a first

play program chain (auto start code), playback of this program chain will be started automatically.

[0469]When the power key is pressed by <4> power turns and a tray open condition, it becomes power OFF after tray closing.

[0470][The function of 5 g of opening/closing keys (OPEN/CLOSE)]

<5> disk trays are opened or closed. If the opening/closing key is pressed during disk reproduction, the device operations till then are completed and a disk tray opens. Operation of 5 g of this key is repealed during recording.

[0471]If the opening/closing key is pressed by <6> power OFF and tray close status, and a disk tray opens. [ a power supply ]

[0472]If the opening/closing key is pressed by <7> disk-tray open condition, a disk tray will be drawn in a device main frame. If the disk is set to the tray at this time, that management information will be read and the kind (DVD-RW, DVD-R, or DVD video) of set disk will be displayed. That is displayed when the disk is a playback impossible disk.

[0473]If the opening/closing key is pressed by <8> disk-tray open condition, a disk tray will be drawn in a device main frame. If the disk is not set to the tray at this time, a character called "NO DISK" is displayed on the indicator 48 or monitor TV, for example (OSD).

[0474]When the disk drawn in the device main frame by one of <9> opening / closing key contains a first play program chain (auto start code), playback of this program chain is started automatically.

[0475][The function of the stop key (STOP) 5e]

If pushed during <10> disk reproduction or recording, playback or recording will be stopped. If pushed during a stop, the title numbers (or title numbers of default configuration) which were being played or recorded till then will be displayed.

[0476][The function of the reproduction key (PLAY) 5c]

If pushed in the state where the disk is set to <11> disk trays, playback of a disk will begin by the setups (the aspect ratio of the screen which default configuration or a user set up, a spoken language, a title language, etc.) in the time.

[0477]After setting a disk on a tray by <12> disk-tray open condition, when the reproduction key is pressed, a tray is drawn in a device main frame and playback is started from the default title (or title specified by a title maker) currently recorded on the DVD disk. However, it is performed when a disk contains a first play program chain (auto start code).

[0478]Reproduction motion will be ended, if it plays until a title finishes unless it specifies in particular by the recorded information on <13> disks.

[0479]If pushed in the state where a chapter and title numbers are set up during <14> memory-setting screen display in the setting screen, memory reproduction will be started from the place of the set-up chapter and title numbers.

[0480]If it is pushed when <15> random modes are set up, random reproduction of the contents of the disk set to the tray will be carried out.

[0481]When the cell reproduction mode of a disk becomes a still during <16> playbacks, the reproduction motion till then will be canceled and it will be in the Still Picture Sub-Division reproduction state.

[0482][The function of 5 d of halt keys (PAUSE)]

<17> If pushed during the program chain reproduction in a certain title, it will become Still Picture Sub-Division by the video frame of the program chain under present reproduction. If the halt key is further pressed in this state, it will change to Still Picture Sub-Division of the

following frame. Like the following, whenever it presses the halt key, a frame changes to the direction of movement of time, and top delivery for the number of times which pressed this key is performed.

[0483]It can avoid reproducing a sound, although a sub video image is reproduced during <18> above-mentioned Still Picture Sub-Division or top delivery reproduction.

[0484]<19> This Still Picture Sub-Division / top delivery are possible only within the program chain under present reproduction, and after top delivery is carried out to the final frame in a title, this key operation becomes invalid.

[0485]When it is a still by <20> cell reproduction mode, in the final cell of a still cell, this key operation becomes invalid.

[0486]<21> If the reproduction key is pressed in the state of Still Picture Sub-Division by this key operation, it will return to ordinary reproduction.

[0487][-- skip key [ 5f ] (SKIP / two-step Mark Misumi with a rightward vertical line) \*\*\*\* -- the case of the 1;1 sequential program chain title --]

If pushed during <22> reproduction, the next chapter (or program) in the title under present reproduction will be searched, and it will be reproduced. When there is no following chapter, this key operation becomes invalid. During a chapter search, a user can be notified of the search place chapter number of the indicator 48 (or OSD) being blinked, and it being under search.

[0488]If it pushes during <23> stops, the next chapter of the present chapter will be chosen. The selected chapter will be searched and reproduced if one [ here / a reproduction key ].

[0489]In a stop, the skip of the chapter (or program) over two titles can be performed. For example, if this skip key is further pressed when the last chapter number of the title 1 is displayed, the first chapter number of the title 2 will be chosen. If one [ here / a reproduction key ], the selected chapter (chapter 1 of the title 2) will be searched and reproduced.

[0490]If beyond predetermined time continues being pushed by <24> halt conditions, a chapter number will advance every [ 1 ] at a fixed speed (when there is the following title, continuation change of the chapter number over the following title is enabled from the present title). If the reproduction key is pressed after detaching this skip key it is continuing pressing, the chapter of the title at that time will be searched and reproduced.

[0491][-- skip key [ 5f ] (SKIP / two-step Mark Misumi with a rightward vertical line) \*\*\*\* -- the case of the 2; random program chain title --]

If it pushes during <25> reproduction, the chapter (or program) by which random selection was made will be searched to the next of the chapter in the title under present reproduction, and it will be reproduced. However, the number of times of a random reproduction loop is the last, and when there is no following program chain into a title, this key operation becomes invalid.

[0492]When pushed during <26> still picture reproduction, the selected chapter (or program) is searched and it becomes still picture reproduction at the head. However, when having become a still by cell reproduction mode, the selected chapter is searched and the still of the head is reproduced.

[0493]It can be used for selections (increment of a number, or forward movement of cursor) of the chapter number (program number) and title numbers which are set up on <27> memory setting screens.

[0494]It can be used for page delivery of <28> menus.

[0495][-- skip key [ 5f ] (SKIP / two-step Mark Misumi with a leftward vertical line) \*\*\*\* -- the case of the 1;1 sequential program chain title --]

If pushed during <29> reproduction, the head of the chapter (or program) under present

reproduction will be searched, and it will be reproduced. If it furthermore pushes continuously, to the chapter number 1, a chapter number will wind every [ 1 ] and will fall.

[0496]If it pushes during <30> stops, the chapter in front of [ of the present chapter ] one will be chosen. The selected chapter will be searched and reproduced if one [ here / a reproduction key ].

[0497]In a stop, the skip of the chapter (or program) over two titles can be performed. For example, if this skip key is further pressed when the chapter number 1 of the title 3 is displayed, the chapter number X of the last of the title 2 will be chosen. If one [ here / a reproduction key ], the selected chapter (chapter X of the title 2) will be searched and reproduced.

[0498]The bottom of chapter \*\*\*\* which straddled this title can perform a \*\* skip until it becomes the chapter 1 of the title 1.

[0499]If beyond predetermined time continues being pushed by <31> halt conditions, at a fixed speed, a chapter number will wind every [ 1 ] and will fall (until it becomes the chapter 1 of the title 1). If the reproduction key is pressed after detaching this skip key it is continuing pressing, the chapter of the title at that time will be searched and reproduced.

[0500][-- skip key [ 5f ] (SKIP / two-step Mark Misumi with a leftward vertical line) \*\*\*\* -- the case of the 2; random program chain title --]

If it pushes during <32> reproduction, the head of the chapter (or program) in the title under present reproduction will be searched, and it will be reproduced. However, even if it pushes continuously, the search place can serve as a head of the chapter (program) under present reproduction.

[0501]When pushed during <33> still picture reproduction, chapter (or program) \*\* under present reproduction carries out a head search, and it becomes still picture reproduction there. When having become a still by cell reproduction mode, the chapter under present reproduction is searched and the still of the head is reproduced.

[0502]It can be used for selections (the decrement of a number, or the setback of cursor) of the chapter number (program number) and title numbers which are set up on <34> memory setting screens.

[0503]It can be used for page return of <35> menus.

[0504][A menu screen key [ 5n ] (MENU) function]

When <36> disks are set to the tray, the repeat display of the route menu within the video title set under present selection currently recorded on the disk is carried out. When the disk is not set, an error (or warning) display is performed (OSD).

[0505]When there is no route menu into the video title set under <37> present selection, an error (or warning) display is performed.

[0506]If it slips out of a menu by menu manipulation after pressing this menu screen key during <38> ordinary reproduction and reproducing a menu, reproduction will be resumed from the part specified with the part or menu which was being reproduced before menu reproduction.

[0507]When it pushes during <39> route menu indication, it returns to the state before a route menu indication.

[0508][The function of the title key (TITLE) 5p]

A title menu is displayed, when <40> disks are set to the tray and the title menu is recorded on the disk. When the disk is not set, an error (or warning) display is performed (OSD).

[0509]When the title menu is not recorded on the disk set to <41> trays, the following operations can be performed during disk reproduction (or under a stop).

[0510]That is, a push on a title key will display title numbers and a chapter number on some screens (for example, upper left corner). If predetermined time (for example, 3 seconds) passes

while the Clear key mentioned later is pressed, the title key is pressed once again or there has been no subsequent key operation, title numbers and a chapter number will be eliminated from a screen.

[0511]A screen display will be set to "title-numbers:2" and "chapter number:1", if desired title numbers (for example, "2") are inputted into a screen from a ten key in the state where title numbers (for example, "1") and a chapter number (for example, "1") are displayed and it will say in the above-mentioned example. or [ pressing the reproduction key in this state ] -- or if predetermined time (for example, 2 seconds) neglect is carried out, reproduction will be started from the chapter 1 of the title 2.

[0512]In this case, a user can be notified of the search place title numbers and the chapter number of the indicator 48 being blinked, and it being under search during the search of a title and a chapter.

[0513]When the title key is again pressed before selection of the title was become final and conclusive after pressing the title key during <42> ordinary reproduction and becoming title menu reproduction, reproduction is resumed from the part which was being reproduced before title menu reproduction.

[0514][The function of a selection key / cursor key (upward and downward Mark Misumi pair) 5q]

It is used for the item selection in <43> disk menus (menu called by the title key or a menu screen key), and the item selection in a setup menu. For example, in the case where the item which has pushed facing up of the above-mentioned selection key / cursor key or downward Mark Misumi is chosen, When that item contains the selection branch of further some, the facing the left of this selection key / cursor key or rightward Mark Misumi can be used for choosing that selection branch.

[0515]In the case where it pushes while preset value displaying either <44> audio streams, an auxiliary video stream or an angle, If upward Mark Misumi of this selection key is pushed, it will change to a following stream or angle, and if downward Mark Misumi is pushed, it will change to the stream or angle in front of one.

[0516]When pushing during the title-numbers display by <45> character generators, if upward Mark Misumi of this selection key is pushed, it will change to the following title, and if downward Mark Misumi is pushed, it will change to SUTAITORU in front of one.

[0517][The function of termination key (END) 5end]

It is used when notifying the end of processing of <46> user-choice setting out to a device (when escaping from processing loops, such as setting out of a refreshable angle).

[0518]Said selection key / cursor key 5q, or the ten key 5t mentioned later can be used for the cursor operation which chooses a desired angle while selection menu screen (not shown) displaying multi-angle. (Although a graphic display is not carried out, mouse operation or touch-panel operation is also realizable.)

[The function of 5 s of determining keys (ENTER)]

It is used when becoming final and conclusive the item selected within <47> disk menus or a setup menu.

[0519]It can be used also when becoming final and conclusive title numbers and a chapter number in <48> memory screens.

[0520][The function of the return key (RETURN) 5r]

It is used when <49> title maker (provider of software) performs the search to the address on the disk set up beforehand. When directing the return (return) operation to the ejection or the point

starting [ reproduction ] (resumption) from a menu, specifically, it is pushed. Or it can be used, also when directing the operation which returns to the selection turning point of the multi-story in which an user choice is possible while reproducing one of multi-stories.

[0521][-- \*\*\*\* of audio key (AUDIO) 5aud -- the case under the 1; reproduction --]

A character generator will be used if the audio key is pressed during <50> playbacks (after investigating the audio stream information recorded on the disk), The language name of the audio stream under present playback is indicated by predetermined time (for example, 3 seconds) on a reproduction screen (OSD). (when the classification of an audio stream is languages, such as music) If the audio key is further pressed during this display, the sound of the following audio stream number will come to be reproduced. If this audio key operation is repeated, the sound (various languages) of the audio stream currently recorded on that title will be reproduced cyclically one by one.

[0522]By pressing said selection key / cursor key 5q during a screen display of <51> audio-stream preset value, it can change to the next audio stream of the audio stream set up now, or the audio stream in front of one. Then, the contents of the changed audio stream are reproduced.

[0523]If the ten key is pressed during a screen display of <52> audio-stream preset value, it can change to the audio stream of the number which carried out the ten key input. Then, the contents of the changed audio stream are reproduced.

[0524]If the Clear key is pressed during a screen display of <53> audio-stream preset value, the preset value display of an audio stream is eliminable from a screen.

[0525][-- \*\*\*\* of audio key (AUDIO) 5aud -- the case under the 2; stop (under a blaubok screen display) --]

A character generator will be used if the audio key is pressed during <54> stops (after investigating the audio stream information recorded on the disk), The language name of the audio stream set as the title chosen now is indicated by predetermined time (for example, 3 seconds) on a blaubok screen (when the classification of an audio stream is language). If the audio key is further pressed during this display, the following audio stream number will be set up. If this audio key operation is repeated, the audio stream sound currently recorded on that title will be set up and displayed cyclically one by one.

[0526]If said selection key / cursor key 5q are pressed during a blaubok screen display of <55> audio-stream preset value, it will change to the next audio stream of the audio stream set up now, or the audio stream in front of one.

[0527]If the ten key is pressed during a blaubok screen display of <56> audio-stream preset value, it will change to the audio stream of the number which carried out the ten key input.

[0528]If the Clear key is pressed during a blaubok screen display of <57> audio-stream preset value, the preset value display of an audio stream will be eliminated from a screen.

[0529][-- \*\*\*\* of subtitle key (SUBTITLE) 5sbt -- the case under the 1; reproduction --]

If it pushes during <58> playbacks, the language name of the auxiliary video stream under present playback will be indicated by predetermined time (for example, 3 seconds) on a reproduction screen using a character generator (OSD). (after investigating the auxiliary video stream information recorded on the disk) (when the classification of an auxiliary video stream is language) If the subtitle key is further pressed during this display, the sub video image of the following stream number will come to be reproduced. If this subtitle key operation is repeated, the auxiliary video stream currently recorded on that title will be reproduced cyclically one by one.

[0530]By pressing said selection key / cursor key 5q during a screen display of <59> auxiliary-

video-stream preset value, it can change to the next auxiliary video stream of the auxiliary video stream set up now, or the auxiliary video stream in front of one. Then, the contents of the changed auxiliary video stream are reproduced.

[0531]If the ten key is pressed during a screen display of <60> auxiliary-video-stream preset value, it can change to the auxiliary video stream of the number which carried out the ten key input. Then, the contents of the changed auxiliary video stream are reproduced.

[0532]If the Clear key is pressed during a screen display of <61> auxiliary-video-stream preset value, the preset value display of an auxiliary video stream is eliminable from a screen.

[0533][-- \*\*\*\* of subtitle key (SUBTITLE) 5sbt -- the case under the 2; stop (under a blaubok screen display) --]

A character generator will be used if the subtitle key is pressed during <62> stops (after investigating the auxiliary video stream information recorded on the disk), The language name of the auxiliary video stream set as the title chosen now is indicated by predetermined time (for example, 3 seconds) on a blaubok screen (when the classification of an auxiliary video stream is language). If the subtitle key is further pressed during this display, the following auxiliary video stream number will be set up. If this subtitle key operation is repeated, the auxiliary video stream sound currently recorded on that title will be set up and displayed cyclically one by one.

[0534]If said selection key / cursor key 5q are pressed during a blaubok screen display of <63> auxiliary-video-stream preset value, it will change to the next auxiliary video stream of the auxiliary video stream set up now, or the auxiliary video stream in front of one.

[0535]If the ten key is pressed during a blaubok screen display of <64> auxiliary-video-stream preset value, it will change to the auxiliary video stream of the number which carried out the ten key input.

[0536]If the Clear key is pressed during a blaubok screen display of <65> auxiliary-video-stream preset value, the preset value display of an auxiliary video stream will be eliminated from a screen.

[0537][The function of the subtitle one/off-key (SUBTITLE ON/OFF) 5v]

The display of <66> sub video images (subtitle) is turned on and off.

[0538]When the subtitle one/off-key is pressed during <67> video recovery and a sub video image display (sub video image display one established state), while an auxiliary video stream number preset value is turned off, After a predetermined time (for example, 3 seconds) indication (OSD) of the preset value is given with a character generator, a sub video image is eliminated from a screen.

[0539]When the sub video image is not but displayed during <68> video recovery (sub video image display OFF established state) and the subtitle one/off-key is pressed, while one [ an auxiliary video stream number preset value ], After a predetermined time (for example, 3 seconds) indication of the preset value is given with a character generator, the sub video image of the language of the setting-out stream number [ one / the stream number ] is played (when the sub video image is recorded on the disk under playback).

[0540]When the subtitle one/off-key is pressed during <69> video-recovery stop, only on-off setting out of a sub video image display can be performed.

[0541]When the force rendering command is included in the auxiliary video stream of the same linguistic code as the audio stream currently reproduced, the sub video image corresponding to this command is certainly reproduced, it comes out to a screen and it is made to draw in <70> sub video image display OFF established state.

[0542][The function of angle key (ANGLE) 5ang]

If it pushes when the title with the angle iron which comprises <71> multi-angle information is chosen and this angle iron (angle section) is reproduced, A predetermined time (for example, 5 seconds) indication of the angle number under present reproduction is given by a character generator (OSD). If the angle key is pressed once again during [ this ] the angle number display, the identical time point of the cell of the following angle number will be searched, and reproduction will be started from there.

[0543]For example, a certain batter's home run scene is reproduced by the angle number 1 (camera angle which looks at a pitcher's back from the center side) of the multi angle block, A bat hits a ball accurately 5 seconds after the reproduction start time of the angle iron cell, and also suppose that a hit ball is pierced in the right stand in 3 seconds. If the user who thought would like to see this home run scene with another camera angle presses the angle key and pushes the angle number 2, The reproduction start time point of the angle iron cell is searched, and reproduction of the home run scene in the angle 2 (for example, camera angle which looks at the whole ground from the first base infield stand side) comes to be resumed from there.

[0544]If the angle key is further pressed during the above-mentioned angle number display, the angle number currently recorded will change cyclically one by one, and reproduction of the angle after selection will be resumed.

[0545]When a screen display of the angle number is carried out with <72> character generators, a desired angle number can also be direct chosen by tenkeys operation (the keystroke is invalid when the ten key input of the angle number which does not exist in the angle iron under reproduction is carried out). Or you can also make it go up and down an angle number by said selection key / cursor key 5q.

[0546]Also when an angle change is performed during still picture reproduction within the cell of <73> multi angle blocks, a search is performed at the same reproduction time and Still Picture Sub-Division of searched another angle is reproduced.

[0547]For example, it is assumed that Still Picture Sub-Division of a certain car was reproduced by the angle number 1 (camera angle seen from a transverse plane). If the user who thought would like to see this car with another camera angle presses the angle key and pushes the angle number 2, the reproduction start time point of the angle iron cell of the angle number 2 will be searched, and Still Picture Sub-Division in the angle 2 (for example, camera angle seen from a right lateral) will be reproduced from there.

[0548]If the angle key is further pressed during the above-mentioned angle number display, the angle number currently recorded will change cyclically one by one, and Still Picture Sub-Division of the angle after selection will be reproduced.

[0549]Even if it performs angle key operation during the cell reproduction of those other than <74> multi angle blocks, it can avoid receiving angle setting out (angle number change). Angle setting out (angle number change) is restricted and received when a multi angle block cell exists in the title under reproduction.

[0550]<75> When a multi angle block cell exists in the selected title, even if it is under stop, angle setting out (angle number change) can be received.

[0551][-- rapid-traverse (FWD) key/-- already returning (REV) -- function] of the key (leftward and rightward double Mark Misumi) 5j

under <76> moving image reproduction or still picture reproduction -- a rapid-traverse key -- or - - already -- return key press \*\* and the time of ordinary reproduction -- early (for example, twice [ about ] at the time of ordinary reproduction) -- a rapid traverse -- or return reproduction is already performed. (By an animation, a motion becomes double speed and the top delivery

change cycle is shortened in a half in Still Picture Sub-Division.) if it continues pushing further - the time of ordinary reproduction -- further -- early (for example, about 8 times at the time of ordinary reproduction) -- a rapid traverse -- or return reproduction is already performed. (By an animation, a motion will be 8X and the top delivery display switching cycle is shortened to one eighth in Still Picture Sub-Division.)

In the repeat display of a rapid traverse and the main video image video in already return, the I picture +P picture of MPEG is played, and it can constitute from 2X at the many double speed beyond it so that I picture may be played.

[0552]In that case, it can be performed as follows about sound reproduction. That is, in the case of 2X reproduction, voice data is decoded with a twice as many clock as ordinary reproduction, and 2X voice data is decoded. In the case of many double speed, voice decoding at the time of many double speed is performed by reproducing selectively the voice data of the point jumped (from a certain I picture to the following I picture) by ordinary reproduction.

[0553]if the <77> reproduction keys are pressed -- fast forwarding reproduction -- or return reproduction is canceled and usually already returns to reproduction of speed.

[0554]The <78> above-mentioned rapid-traverse key, a rapid traverse already according to a return key, or when return reproduction already carries out the key operation, it is carried out only within the program chain under reproduction. After being fast forwarded to the last of the program chain or already making return to the head of the program chain, it will be in a temporary stopped state there.

[0555]the <79> above-mentioned rapid-traverse key or a rapid traverse already according to a return key -- or reproduction of a sound (audio stream) and a subtitle (auxiliary video stream) can already be automatically forbidden during return reproduction.

[0556]It may be made to reproduce, changing a reproduction pitch about a sound corresponding to fast traverse. the time of an animation being a documentary film of a marathon game for example, and the subtitle being used for the display of the time progress from a game start -- a rapid traverse -- or it may be made to already reproduce a subtitle at the time of return reproduction

[0557]the <80> above-mentioned rapid-traverse key, a rapid traverse already according to a return key, or the case where cell reproduction mode already becomes a still during return reproduction -- a rapid traverse -- or return operation is canceled and already goes into still picture reproduction. When cell reproduction mode is a still, by pressing the rapid-traverse key (or already return key), continuation top delivery (or continuation top return) operation can be started at the change rate of about 1 screen, for example per second. If it continues pressing further the rapid-traverse key (or already return key) at this time, continuation top delivery (or continuation top return) operation can be started, for example at the rate of about 4 screens / second. If it pushes further once again, it can return to continuation top delivery (or continuation top return) operation of the rate of about 1 screen / second. this continuation top delivery (or continuation top return) -- if it separates from cell reproduction mode working, about 2X rapid-traverse (or already return) reproduction can be performed.

[0558]the above "case [ cell reproduction mode became a still ]" -- the still (VOBU still) of a video object unit unit -- it will become a still, if it becomes and the above-mentioned rapid-traverse key (or already return key) will be pressed, the next VOB (or before) is reproduced and reproduction of the VOB is completed. However, if the above-mentioned rapid-traverse key (or already return key) is further pressed during VOB reproduction, the VOB is fast forwarded (or already return), and it will become a VOB still after that and will stop.

[0559][The function of the display key (DISPLAY) 5u]

If this key is pressed during <81> stops or reproduction, the display corresponding to the various contents of key operation at that time will be performed (on the screen of the indicator 48 of a device main frame, and/or the monitor section 6).

[0560][The function of 5 t of ten keys ([0] - [9] & [+10])]

During <82> ordinary reproduction, it can be used for specification of the chapter number in the present playback title. It goes into the search operation to the chapter of the number simultaneously specified as ten key input decision (said determining key operation) (this search can be enabled by the title-numbers key T mentioned later). The chapter number not existing is not received.

[0561]It can be used for specification of the chapter number in the title chosen during <83> stops. It goes into the search operation to the chapter of the number specified simultaneously with ten key input decision (this search is possible by the title-numbers key T). The chapter number not existing is not received.

[0562]The title having contained <84> multi angle blocks is under reproduction (under angle cell reproduction), and the angle number by which the ten key input was carried out is direct chosen at the time under angle number display. However, the input of the angle number not existing is not received.

[0563]When the number is given to the item in each disk menu screen during <85> disk menu displays, the item corresponding to the number which carried out the ten key input is chosen and performed. However, the input of the item number not existing is not received.

[0564]When setting up a parental lock from <86> setup menu, a ten key can be used for the input of a password.

[0565][The function of Clear key (CLEAR) 5cr]

It is used for cancellation of a keystroke of <87> title numbers or a chapter number.

[0566]It is used for cancellation of the password input for <88> parental level change.

[0567]<89> It is used for release in the repeat mode mentioned later.

[0568]<90> It is used for cancellation of the input number at the time of the memory setting menu manipulation mentioned later.

[0569]<91> It is used for the release of memory reproduction mode mentioned later.

[0570]<92> It is used for the release of random reproduction mode mentioned later.

[0571]It is used for cancellation of the number display of <93> titles, a sound (audio stream), a subtitle (auxiliary video stream), and each angle.

[0572][The function of the repeat key (REPEAT) 5k]

It uses for repeat setting out of <94> chapters or a title (however, only in case of title of 1 sequential program chain).

[0573]<95> Whenever it presses this key, as it was called "chapter repeat" -> "title repeat" -> "repeat-off" -> "a chapter repeat", repeat mode is changed cyclically one by one.

[0574]<96> If the repeat key is pressed during the A-B repeat operation mentioned later, A-B repeat operation is canceled and it can shift to a chapter repeat.

[0575]<97> rapid-traverse key -- repeat operation will be canceled if it already separates from the repeat section by operation of a return key or a skip key.

[0576]When a multi angle block is within <98> repeat sections, an angle change presupposes that it is possible (said angle key functions also within repeat mode).

[0577][The function of the A-B repeat key (A-B REPEAT) 5k]

It uses for setting up the starting point and the terminal point of repeat operation for < 99> 2

points (however, only in case of title of 1 sequential program chain).

[0578]<100> The starting point (A) is set as the 1st time by pressing this key, and a terminal point (B) is set up by pushing on the 2nd time. The starting point set up simultaneously with the terminal completion of setting out is searched, and between A-B is reproduced repeatedly henceforth.

[0579]The repeat between <101> A-B can be canceled by said Clear key operation.

[0580]When changed into titles other than between A-B, or reproduction of a chapter during <102> A-B repeat operation, or when said repeat key is pressed, the repeat between A-B can be canceled.

[0581]a <103> rapid-traverse key -- if it already separates from the A-B repeat section by operation of a return key or a skip key, A-B repeat operation will be canceled.

[0582]A-B repeat operation can be canceled before setting out of <104> repeat terminal points (B) a Clear key, a rapid-traverse key, and by already pressing the return key or the skip key.

[0583]When a title is completed before reaching during <105> A-B repeat reproduction at a terminal point (B), A-B repeat operation is canceled.

[0584]Within the <106> multi angle block sections, setting out of the starting point (A) of the repeat between A-B can be repealed. (The head of the multi angle block section can be made into the starting point of the repeat between A-B.) For example, the camera angle scene of the angle number 1 of a certain multi angle block can be made to repeat between A-B in the proposal bull block.

When a multi angle block comes during <107> A-B repeat reproduction, A-B repeat operation can be canceled.

[0585]The starting point (A) and the terminal point (B) which were set up by the repeat key between <108> A-B come to point out the head (start address) of the corresponding image data (glue PUOB picture) immediately after setting out.

[0586][The function of 5 m of memory keys (MEMORY)]

When <109> trays are closed and the disk is set, pressing this key and a memory setting screen are displayed (OSD). When this key is pressed during a memory setting screen display, it returns to the state before a memory setting screen display.

[0587]The <110> memory-setting method is performed by inputting the number of the title memory reproduction is carried out [ title ], and a chapter one by one by said ten key and the title-numbers (T) key mentioned later, and going during a memory setting screen display.

[0588]<111> If the cursor in a display screen is moved by said selection key / cursor key and the above-mentioned memory setting input is performed with the memory number of the cursor position, every one title chapter number set up with the memory number after the memory number will shift to a back memory number.

[0589]For example, "title 1 and the chapter 3" and the "title 2 and a chapter 1" are already set up with the memory number 1 and the memory number 2, and suppose that he had no setting out after the memory number 3. Supposing it doubles cursor with the memory number 1 here and sets up "title 2 and the chapter 5", the contents set as the memory number 1 and the memory number 2 till then will be shifted to the memory number 2 and the memory number 3. As a result, the setting detail of the memory numbers 1, 2, and 3 serves as "title 2 and the chapter 5", the "title 1 and a chapter 3", and the "title 2 and a chapter 1", respectively.

[0590]<112> If the cursor in a display screen is moved by said selection key / cursor key and said Clear key operation is performed with the memory number of the cursor position, The contents set up with the memory number are cleared, and the contents set up with the memory

number after the memory number advance to the memory number in front of one.

[0591]For example, "title 2 and the chapter 5", the "title 1 and a chapter 3", and the "title 2 and a chapter 1" are set as the memory number 1, the memory number 2, and the memory number 3, respectively, and suppose that he had no setting out after the memory number 4. If cursor is doubled with the memory number 2 here and Clear key operation is performed, The contents "title 1 and chapter 3" set as the memory number 2 till then are cleared, the contents set as the memory number 3 till then shift to the memory number 2, and the contents (setting [ no ] up) set as the memory number 4 till then shift to the memory number 3. As a result, the setting detail of the memory numbers 1, 2, and 3 is "title 2 and the chapter 5", the "title 2 and a chapter 1", and "no setting up" up, respectively.

[0592]Although there is not necessarily necessity which imposes restriction on the number of memory setting (maximum of a memory number), the maximum number of memory setting is chosen about as 30 from the problem of the physical memory space by the side of the necessity in actual software, and a device, for example. (Though 99 titles is recorded on the disk of one sheet, speaking as a general user, the maximum number of memory setting is not necessarily needed 99.) The demand which carries out memory setting to two or more chapters in each title of 99 with a business-use device on the other hand may come out, and it is good as for 99 or more in the maximum number of memory setting in that case.

If said reproduction key is pressed during a <113> memory-setting screen display, memory reproduction will be started in the turn which carried out memory setting registration.

[0593]For example, to the memory number 1, the memory number 2, and the memory number 3, respectively, "Title 2 and the chapter 5", the "title 1 and a chapter 3", and the "title 2 and a chapter 1" are set up, and it did not set up after the memory number 4, and if the reproduction key is pressed during a memory setting screen display in the state, memory reproduction will be performed as follows. That is, "title 2 and the chapter 5" are reproduced first, then "title 1 and the chapter 3" are reproduced, and, finally "title 2 and the chapter 1" are reproduced. After reproduction of "title 2 and the chapter 1" is completed, reproduction stops.

[0594]Memory reproduction mode can be canceled and it can be made to shift to ordinary reproduction as it is by pressing said Clear key during <114> memory reproduction.

[0595]The contents set up on <115> memory setting screens are clearable by the following methods.

[0596](b) Eliminate all the title numbers and chapter numbers set up during a memory setting screen display by a Clear key.

[0597](\*\*) When the tray was opened and a disk is discharged out of a device. (However, in the business-use device, even if a nonvolatile internal memory is provided in the inside of a device and it discharges a disk, memory setting may be saved with the code which specifies the disk.)

[The function of Randa Muqui (RANDOM) 5rm]

<116> When the title chosen is 1 sequential program chain, random reproduction of the chapter within the title is performed.

[0598]If this key is pressed during <117> reproduction, it will go into random reproduction from the next chapter of the chapter reproduced now. (For example, if Randa Muqui is pushed while reproducing the chapter 2 of the title containing the chapters 1-9, when starting reproduction of the chapter 3, it will become random reproduction, and each chapter will be reproduced at random, for example like the chapters 5, 3, 7, 1, and 9.)

[0599]If this key is pressed during <118> stops, since said reproduction key was pressed next and began disk reproduction, it will go into random reproduction.

[0600]<119> It becomes a reproduction stop after the random reproduction of all the chapters in the title chosen is completed. During this random reproduction, duplication reproduction of the same chapter number is not usually performed, but only suppose that it is to randomize reproduction sequence to the last. However, unless it is good also as possible, and a power supply is turned off in random reproduction including duplication reproduction or the stop key is pressed, it may be made to repeat random reproduction by an infinite loop.